AN INVESTIGATION OF DIVIDEND SIGNALLING ON THE NEW ZEALAND STOCK EXCHANGE IN THE 1990S AND OF SEVERAL NEW TOOLS EMPLOYABLE IN SUCH AN INVESTIGATION

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Abstract

This thesis investigates the nature of joint dividend-and-earnings signalling in announcements to the New Zealand Stock Exchange in the 1990s. Initially the Market Model is used to compute expected returns, and the abnormal returns derived from these are subjected to restricted least squares regressions to separate out a putative dividend signal from the concurrent earnings signal. But with the Market Model, the zero-value company returns associated with an absence of trading in thinly traded stocks are over-represented in returns distributions leading to problems of bias. New models are developed that explicitly exploit zero returns. The first alternative methodology entails friction modelling, which uses a maximum likelihood estimation procedure to find the relationship coefficients and the range of returns that "should" be considered as zero, and then proceeds to treat them as a separate category. The second alternative methodology is that of state asset models, which take a fresh new look at investor perceptions of the connection between movements in company returns and those of the concurrent underlying market. Zero-value company returns cease to be zero in value, where a state model is rotated, or alternatively they can be modelled as an extra state. All three methodologies furnish some evidence of dividend signalling; but this evidence is highly dependent on small changes within the given methodology.

Key Words

Key words apropriate to this thesis according to the system laid out by the Journal of Economic Literature (JEL):

G12 Asset Pricing

G14 Information on Market Efficiency / Event Studies

C22 Cross-Sectional Models

C22 Time Series Models

C24 Truncated and Censored Models

N27 Financial Markets and Insitutions, Oceania (New Zealand)

Other useful keywords:

Dividend Signal

State Asset Pricing Model

Friction Model

Market Model

1 Introduction

Is there a dividend signal? In an efficient market, the reaction to the advent of fresh news should be short and fast. The investigation will entail an event study in which the event is the announcement of dividends and the unit of measurement of the effect on share prices will be the cumulative (or single day) abnormal return. This can be understood as the element of surprise in the price change recorded at the time of the news release. The time of the news release will be known in the study as the 'event window'.

But life is not that simple. In New Zealand it is not practical to measure just dividend announcement events because they occur bundled up with earnings announcement events in one-and-the-same news release. Therefore an investigation of dividend signalling effects must, by necessity, be an investigation of joint dividend-and-earnings announcement effects where there is the possibility of interactions between the two newsworthy items.

For more than half a century, the connection between dividend policy and the value of the firm has been the subject of scrutiny resulting in a vast output of academic papers. This is a body of research that has many branches, many (but not all) of which are discussed at some length in Chapter 2, which is the thesis literature review. The particular branch of research effort to which this thesis belongs is the study of joint dividend and earnings announcements — which do not occur much in the United States, but are the commonest form of dividend disclosure in the United Kingdom, Australia and in New Zealand.

Where the dividend signal must be distinguished from the signal of future company performance that investors infer from the concurrent earnings news, there is some statistical unbundling to be done. There has to be a method for discriminating between signals emanating from the dividend component of an announcement, and from the earnings component of the announcement. An ordinary least squares (OLS) regression technique known as restricted least squares regression allows us to do this — once we have our abnormal returns. These abnormal returns are compiled from expected returns generated by the estimation of the Market Model on log return data in a set preliminary stretch of time known as the estimation period. So, effectively we have two linked methodologies — restricted least squares regression on cross-sectional abnormal return data and the Market Model (which is a time-series tool) for forecasting abnormal returns. Chapter 3 provides a fuller explanation of these linked methodologies along with the research question and some hypotheses.

However, the above linked methodologies have an Achilles heel. This flaw is the fact that OLS regressions furnish biased coefficients in the presence of thin trading, which can be defined as either non-synchronous trading, or as the failure of a share to trade on a particular day — or even during entire rafts of days on end. A review of papers examining the nature of thin trading and suggesting putative solutions for the econometric problems it causes is provided in Section 2.3 of Chapter 2, while Section 2.4 provides an introduction to the first of two potential solutions to the thin trading problem. The first solution is a friction modelling methodology. Given that this thesis breaks new ground in this respect, the subsections associated with Section 2.4 can only provide a review of how friction models have been applied in other contexts. Section 2.5 then discloses a short review of studies employing state asset models — which constitute the second possible approach to working in the context of a thinly-traded market.

Following Chapter 2 come the initial methodology and results chapters. In the first instance, I adhere to the Market Model methodology used in prior studies — and which ignores the presence of thin trading. Chapter 3 lays out the research questions pertaining to dividend signalling and explores Market Model methodology in detail. Then Chapters 4 and 5, I table the results associated with this methodology.

Chapter 6 then moves the study away from OLS regression and a Friction Model methodology is developed and employed. The underlying assumption is that zero returns and returns that arguably, should be considered to be the equivalent of zero returns, suppress the slope coefficient and thus distort the calculation of abnormal returns. Removing these zero returns from the estimation of beta increases its value.

The final methodology to be put under the microscope entails a series of state asset pricing models, which employ OLS regression — but whose residuals have better characteristics. This occurs in Chapter 7. Here I return to an OLS regression methodology, but this time, the data is partitioned into different 'states' according to whether the company returns and market returns are negative, zero or positive. As can be expected, when information about company returns (the dependent variable in the expected return estimation procedure) is employed in the form of extra variables on the right-hand side of the regression procedure of state asset pricing models, the correlation between it and market returns is significantly improved over the one furnished by the standard Market Model. In addition, the explicit incorporation of zero-value returns, as a discrete 'state' into models developed in this chapter shows that earlier researchers may have misconstrued the nature of what is called the rotated four-state model.

This is then followed by a discussion of conclusions and limitations in Chapter 8, which, in turn, is followed by a bibliography and the appendices.

2 Literature Review.

2.1 Chapter Introduction

Dividend policy has been the subject of investigation and debate for almost 50 years, most of it conducted in the United States of America. Before regression analysis was applied by John Lintner in 1956 to the behaviour of a small group of American industrial companies, conventional wisdom held that dividends were good and should be maximized by firms wherever possible. Lintner, who showed that firms adopted and tended to adhere to optimal long-term dividend payout ratios which were relatively stable, suggested that managers would only raise a firm's dividend if they were confident that the firm's future earnings could be maintained at a consistently higher level in the future. An implication of this was that the announcement of a dividend increase might convey useful information about future earnings. Lintner's work (and the work of Darling (1957) who confirmed the relationship between dividends and past and current earnings) opened a Pandora's box of dividend-related phenomena, the validity of which, other researchers have spent years and decades debating closely.[1]

In a series of papers at the beginning of the 1960s, Miller and Modigliani (in particular, Miller and Modigliani, 1961) provided a mathematically consistent theory of capital structure in which dividends were shown to be irrelevant to a firm's value. But this did not appear to coincide with the observed behaviour of dividend policy-setters in a sufficiently watertight fashion. A competing theory, which stated that dividends directly contributed to the value of a firm, was produced by Gordon (1962).[2] Gordon's model for the valuation of a firm's share price is still presented in current introductory finance texts. Hence, the current dilemma concerning the role

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[1] Lintner's findings have been reconfirmed by a large number of studies over the decades. An excellent overview of work relating to the aspect of dividend stability is provided by Cahit Adaoglu of the Eastern Mediterranean University, in his (July 2000) working paper, "Instability in the Dividend Policy of the Istanbul Stock Exchange (ISE) Corporations: Evidence from an Emerging Market". Early confirmations with respect to United States data were made by Brittain (1964), Brittain (1966), and Fama and Babiak (1968). McDonald, Jacquillat and Nussenbaum (1975) observed dividend policies in France; Chateau (1979) published results with respect to Canadian companies; Shevlin (1982) observed the stability of dividend policies in Australia. More recently Leithner and Zimmermann (1993) tested the dividend stability of West German (prior to Unification), British, French and Swiss companies; and dividend stability in the United Kingdom was further assessed by Lasfer (1996). Dividend policies in Japan were found to be stable by Kato and Loewenstein (1995), and also by Dewenter and Warther (1998), who compared the Japanese market with the market in the United States. Adaoglu himself however, observing firms on the Istanbul Stock Exchange, confirmed Glen, Karmokolias, Miller and Shah (1995), who found relatively unstable dividend policies in emerging markets.

[2] This has been shown to be based on at least one flawed assumption (Brennan, 1971), but has not been disproved to the satisfaction of all scholars.

of dividends in the discipline of Financial Economics was laid bare almost forty years ago. It is best summed up in the words of Black (1976)[3]:

> *The harder we look at the dividend picture, the more it seems like a puzzle, with pieces that just don't fit together.*

But the debate was, however, broadened by Miller and Modigliani (1961), who added several adjuncts to their assertion of dividend irrelevance to the firm's value. One of these was the existence of tax clienteles. Investors would choose the kind of firm they wanted to invest in with respect to the firm's dividend policy and thereby sort themselves into clientele groups. Investors who wished to accumulate long-term wealth would choose firms with low or zero dividend payouts, while those who wished to have a steady dividend income to meet short-term consumption needs would invest in firms with a tradition of high dividend payout ratios.[4]

The existence and effects of tax clienteles have been analyzed by a large number of scholars. Brennan (1971), for instance, argued that the existence of a clientele effect would logically have no impact on the value of the firm, while Long (1978) and Litzenberger and Ramaswamy (1982) presented evidence that it did. No clear, irrefutable resolution to this debate has yet emerged. A further kind of clientele has also been discussed by Black and Scholes (1974) and Pettit (1977): clientele groupings based on the transactions costs of share trading.

The other important adjunct Miller and Modigliani posited was that a firm's choice of dividend might be seen as a signal to investors (actual and potential), which contained hitherto unavailable information concerning the firm's future earnings prospects. This conclusion was to be the starting point of a forty-year record of research into the existence and nature of signals putatively broadcasted in dividend announcements.

But dividend research did not develop in isolation from other major developments. The 1950s and 1960s were fertile times in the development of financial economics. It was in this period that Sharpe (1964) and Lintner (1965) developed the Capital Asset Pricing Model (CAPM). This was also the time that the Efficient Markets Hypothesis was generated. This development in particular, provided stimulus for investigation of share price behaviour associated with dividend announcements. In fact, it was not until the tail end of the 1970s that a proper basis for a theory of dividend signalling was formulated.

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[3] Black (1976), p. 5.

[4] The payout ratio measures the dividend paid out as a percentage of net profit after tax available for potential distribution to shareholders.

However, research into dividend signalling has been very much dependent on the econometric tools at hand for conducting it. Until recently the primary methodology employed in studies was the Market Model event study. This entailed comparing the behaviour of a version of share price returns during an event window (in which a dividend announcement was made) with the behaviour of returns from a broader test period encompassing that test period. The periodic return used was an abnormal return, which was generated by subtracting a market risk-adjusted expected return from the actual monthly (or later daily) return captured from closing prices. This methodology has been found to be flawed when firms' shares (for whatever reason) fail to trade in a timely manner in each specified trading period. The flaw — which is the exaggeration of abnormal returns by the understating of expected returns — potentially makes a nonsense of event study research conducted on small markets such as the New Zealand Share Market. When a firm's shares do not trade over sequential periods, zero returns are generated; and when the shares trade only very infrequently, the numbers of these zero returns will be large. This is a noteworthy issue because they are a major cause of non-normality in the residuals from the regression used to calculate the parameters of the standard Market Model. This thesis investigates two strategies for overcoming this "thin trading" problem. Therefore the literature records associated with both of these items must also be considered in this chapter.

Hence this literature review is laid out as follows. Section 2.2 deals with the broad sweep of dividend signalling research. In Section 2.3 we traverse the thirty-year record of attempts to redress the problem of thin trading and that of a closely related problem known as nonsynchronous trading. This section also provides a background showing how the problem is faced — or has been finessed. Section 2.4 then moves on to the use of friction modelling, which is grounded in the methodology of maximum likelihood estimation. I posit friction modelling as a possible solution to the econometric issues associated with the thin trading phenomenon. This section provides an explanation of the methodology and explores studies which have already employed it. Then the final section, Section 2.5 looks at the literature associated with unrotated and rotated Asset State Models. These, I posit, provide an alternative way of handling the thin trading problem.

2.2 Dividend and Dividend Signalling Research

2.2.1 Section Introduction

This Section covers almost fifty years of dividend signalling research in general, and the necessary methodological context in which it was conducted. In Subection 2.2.2, early research associated with the development and testing of the Efficient Markets Hypothesis is surveyed.

This is followed in Subsection 2.2.3 by consideration of papers developing and/or supporting the need for a theory of dividend signalling. In Subsection 2.2.4, the evidence for and against the presence of a signal in dividend announcements is investigated in terms of short-term share price effects. (Many of the papers in this section use the Market Model outlined in Subsection 2.2.2). Then Subsection 2.2.5 discusses evidence as to whether the nature of future company earnings actually confirms the putative news content of the dividend signal. From there, Subsection 2.2.6 concentrates on papers dealing with confounding events. The most salient of these is the announcement of earnings in conjunction with the dividend announcement. This, in the context of joint earnings and dividend announcements by New Zealand listed companies in the 1990s is the topic area of the current thesis.

2.2.2 Early Papers (Both EMH and Non-EMH) Prior to a Theory of Dividend Signalling

2.2.2.1 Subsection Introduction

In spite of the foundations laid by Lintner (1956) and Miller and Modigliani (1961), much of the initial thrust in early dividend signalling research was provided by a desire to address a wider, more immediately attention-grabbing issue. This was the matter of whether markets were efficient or whether they contained systematic price-change behaviours which smart market operators could exploit to enrich themselves. In formal terms, this was the advent of research into the Efficient Market Hypothesis (EMH). Subsection Two addresses research directly relating to the development and testing of the EMH, while Subsection Three deals with concurrent papers in the 1970s which addressed ramifications arising from Lintner (1956) and other early dividend papers, but which were not so intimately entwined with the testing of the EMH. Together these subsections pave the research path to the point at which dividend signalling research attained a theory of its own — which is canvassed in Section Three, following this one.

2.2.2.2 The Efficient Markets Hypothesis

The Efficient Markets Hypothesis (EMH) was developed in the late 1960s. Up until the 1950s and 1960s, little research had been conducted into the price behaviour of stock exchanges. Indeed, in an essay pushed in 1993, Ray Ball, speaking of the status quo in 1968, stated[5]:

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[5] Ball (1999) p. 37. This essay was published as a chapter in "The New Corporate Finance" (Second Edition), edited by Donald H. Chew Jnr.

> *The prevailing view among academic economists, even at the University of Chicago, was that the stock market was not a proper subject of serious study.*

However, some work was being done by researchers with a statistical bent. In the absence of an economic theory of stock market pricing, observers of price behaviour noted that it moved more or less randomly. But if this randomness did indeed contain systematic patterns that could be predicted, then astute market participants could possibly make use of these to enrich themselves.[6] So the question that sat begging for an answer was: just how random were movements in share prices? At this time – and even today – forecasts of share prices based on technical analysis of charts of past price movements had (and have) credibility in the eyes of some market participants.

It was a short step from thinking of investigating the randomness of price movements to formalizing the undertaking with a statistical hypothesis. Its name was the Random Walk Hypothesis. This proposed that the price of a share is independent of the share's past prices and is determined by the market clearance of current supply and current demand. In addition, observation of past prices would provide no information about future prices. Early papers employing the Random Walk Hypothesis included Fama (1965), who set out to expose the futility of technical analysis, Samuelson (1965) and Mandelbrot (1966).

The first actual usage of the term "efficient market" appeared in Fama (1965) where it was defined as[7]:

> *…a market where there are large numbers of rational profit-maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants… [and] on average, competition will cause the full effects of new information on intrinsic values to be reflected 'instantaneously' in actual prices.*

EMH as a theory was specified in a very long paper in the Journal of Finance by Fama (1970).

In overview, EMH states that changes in current share prices are based on investors' assessment of new information; and that past news has already been fully impounded in past share prices and thus has no bearing on current price changes. Aside from the impact on supply and demand brought about by changes in available information by which investors can revise their opinion of a share's value, changes in share price should follow a random walk. EMH is stated in three

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[6] Roberts (1959), p. 7

[7] Fama (1965), p. 4. This paper is cited in "The Theory of Stock Market Efficiency: Accomplishments and Limitations" by Ray Ball, which in turn, is a chapter in "The New Corporate Finance" Second Edition (1999), edited by Donald H. Chew.

versions — weak form, semi-strong form and strong form. In the weak form, current prices are independent of past prices. In the semi-strong form, current prices adjust rapidly (approaching simultaneity) to all new public releases of information; and in the strong form, current prices adjust to all new information whether released to the public or restricted to insiders.

Given how plausible the EMH appeared to be, it was to be expected from this time onward, that it would receive rigorous testing. Indeed, over time, a number of anomalies have been documented, which cast some doubt on the validity of the hypothesis. But the hypothesis is not yet fully proven or disproved. Dividend signalling itself, as a branch of finance research, is a development with close links to the EMH debate.

In a closely-related development, Fama, Fisher, Jensen and Roll (1969) were the first researchers to make use of an 'event' period over which price data measurements could be compared with, and distinguished from averaged data collected over a longer prior period.[8] In fact, observations of many share-split 'events' and their associated uniform-length prior-period data adjuncts could be standardized as multiple observations of one event phenomenon at time zero (t_0) to be analyzed in terms of the averaged data from the matched prior-period observations. This was the first use of what has come to be known as the Market Model.

Fama, Fisher, Jensen and Roll used the Market Model to generate an abnormal performance index of monthly returns before and after share-split events with associated dividend announcements by US companies listed on the New York Stock Exchange (NYSE) between 1927 and 1959. There were 940 announcement events in their sample.

Fama et al found that share splits were deemed to be a favorable news event that fuelled investors' anticipation of a related upcoming favorable dividend announcement. The two announcement items together could be interpreted as providing information to the effect that the firm's prospects were excellent. The authors found evidence of a pre-emptive, quite steep rise in their index of cumulative average residuals over the preceding 29 months, but after the announcement event, prices had adjusted within the first month and the graph of the residuals flattened out. In the case of a relative decline in the dividend announced, the cumulative average residuals peaked at the time of the announcement and declined over the next year before leveling out.[9] However, in the case of both dividend increases and dividend decreases, average residuals (that were not cumulated), quickly settled into a pattern that randomly fluctuated about zero.

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[8] Ball (1999) Op. Cit. 5, p. 38.
[9] Fama, Fisher, Jensen and Roll (1969), p. 15. See figures 3b and 3c. The average residuals are depicted in figures 3a and 3b on page 14.

Fama et al interpreted these results as indicating that prices did adjust to new information in a rapid manner, thus supporting the concept of an efficient market. However, they did note their data set did not allow them a full examination of whether or not trading profits could be made by buying before the date of an announcement and selling afterwards. Nevertheless, it was clear that one could not, in any systematic manner, make a profit buying up shares after an announcement event and then reselling them.[10]

Ball and Brown (1968), who picked up the concept of an event study from a 1967 working paper version of Fama, Fisher, Jensen and Roll (1969), employed the Market Model on the publication dates of 2300 accounting earnings figures from 261 New York Stock Exchange-listed companies.[11] These earnings figures were the figures given in company annual reports, which were provided by the Center for Research in Securities Prices (CRSP) database and COMPUSTAT monthly share price data between 1946 and 1966.[12] For the shorter period 1957 – 1965, they recorded an index of abnormal performance with a view to showing that investors absorbed and acted upon information from announcements of net income; and that prices would adjust fast to this new information. What they found was that prices associated with positive announcements tended to drift upward over the preceding twelve months; and that this drift did not taper off until beyond one month after the date of the announcement.[13] Given that the data was monthly in nature, this amounted to a rapid adjustment to the earnings news contained in the just-published company income statement.

The authors' recording of twelve months of abnormal returns leading up to publication date implied that between 85 and 90 percent of the net earnings news information (with respect to the annual reports in their sample) was already captured before the release of the income statement. This caused them to conclude[14]:

> *Since the efficiency of the capital market is largely determined by the adequacy of its data sources, we do not find it disconcerting that the market has turned to other sources which can be acted upon more promptly than annual net income.*

One of the possible candidates identified as such a source by Ball and Brown in their closing words, was the company dividend announcement.

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[10] Ibid, pp. 18 – 20.
[11] From here onward, the New York Stock Exchange will be referred to as the NYSE.
[12] The CRSP database was itself a new development at this time. It was set up in 1960 at the University of Chicago by James H. Lorie. It stored comprehensive data on all NYSE-listed companies and their shares from 1926 onwards. (Reported by Ball (1999) Op Cit. 5, p.39.)
[13] Ball and Brown (1968) p. 169. See Figure 1, "Abnormal Performance Indexes for Various Portfolios".
[14] Ibid, p. 177.

Ball and Brown also made a further interesting point which relates to my current study of dividend announcements made concurrently with earnings announcements. This was that the net income figure stated in the bottom line of a company's income statement contained no irrefutable, absolute truth within itself. Instead, earnings were definable only as an output figure obtained from applying a set of accounting procedures to a set of events with no further 'definitive substantive meaning at all'[15]:

> *Net income is an aggregate of components which are not homogeneous. It is thus alleged to be a "meaningless" figure, not unlike the difference between twenty-seven tables and eight chairs.*

If the earnings figure had any value, then the value lay in its being a clue as to the underlying current financial health of the company and thus a potential diagnostic for guesstimating future company prospects. In this respect, the authors argued it would be dangerous to confuse a lack of substantive meaning with a lack of utility to investors. My thesis involves observation of an impact on investors of dividend figures relating to the near-future disbursement of cold, hard cash — figures possessing substantive meaning as future dollars in the hand, a more ethereal meaning as an indicator of company prospects, and a utility to investors which can vigorously be debated.

The first important empirical paper concentrating solely on dividend announcements was Pettit (1972). Pettit set out to determine if dividend announcements could be associated with the behaviour of ongoing monthly abnormal returns. If they persisted, they would be evidence in contradiction of the EMH. His data set consisted of the dividend changes made by 625 NYSE quoted companies in the period January 1964 to June 1968. He used the Market Model to analyze both daily and monthly abnormal returns on shares held before, during and after a dividend announcement event.

Pettit divided his sample into two groups depending on whether their actual quarterly earnings were greater or less than their expected earnings and then subdivided each group into subgroups with respect to the nature of their change in dividend (no change, omission, reduction, three magnitudes of increase, and initiation of dividend). His examination of the abnormal returns associated with each of these sub-groupings on a second sample of daily data led him to conclude that dividend announcements in all but the dividend-no-change category tended to have a greater impact on investors than did earnings announcements. He discovered that the related

[15] Ibid, p. 160. Note that, in New Zealand, an income statement is formally known as a statement of financial performance.

abnormal returns (ARs) were significant only on the day of the dividend announcement (day t_0) and on day t_1. This finding was to be repeated over and over in later research. On the other hand, Pettit's monthly data set did not furnish significant results at any time past the date of the dividend announcement. These results, Pettit argued, supported the rapid adjustment of prices to new information. This concept is a central tenet of the semi-strong form of the EMH.

However, Charest (1978) recorded a persistence of both monthly and daily excess returns, relating to dividend announcements, for periods far beyond the day of a given dividend's actual announcement. Charest's paper was to be the start of a significant new branch of dividend signalling research — the investigation of post-announcement drifts.[16] Using dividend announcements from the Standard and Poors Annual Dividend Record January 1947 – June 1968 and CRSP monthly data, Charest found monthly and daily excess returns persisted with respect to shares listed on the New York Stock Exchange following announced dividend changes, indicating persistent market inefficiencies.

Although his technique did not enable him to differentiate between impacts on earnings brought about by dividend and other forms of announcements, he noted the existence of positive drifts implying that the initial reaction to announcements of dividend increases tended to be an under-reaction[17]:

> *Even though the market appears to react briskly to dividend increase announcements, it may not react enough since we witness sizable post-announcement residuals. Indeed in years (+1) and (+2) we find an average abnormal upward adjustment of roughly 4% and 17 positive AR's out of 24 [months]. Furthermore, the stocks' average beta risk level hardly changes around dividend increases, keeping close to the 1.01 level.*

However, with respect to post-announcement drifts apparent in the event of dividend decreases, the average beta risk rose from 1.025 to 1.07 by the end of year (+2). Charest did find that 20 of the 24 monthly AR's were negative and that there was an abnormal adjustment by the end of the

[16] There has been a rich chronicle of research in the United States into the seasonal recurrence of abnormal returns associated with quarterly earnings announcements. This ranges from Jones and Litzenberger (1970) through to Ball and Bartov (1995), who provide an excellent who's who of researchers in this field up till that time. In particular, Watts (1975), Foster (1977), and Griffin (1977) developed first-order moving average models showing the existence of serial correlation in seasonally differenced quarterly earnings; and their results were extended by Brown and Rozeff (1979), Bernard and Thomas (1990) and Bartov (1992), who reported a predictable (+ + 0 -) seasonal pattern over the four quarters sustaining an earnings drift discernible for up to four lags. Ball and Bartov (1995) went on to find that the day-of-the-week timing of earnings announcements was dependent on the nature of the earnings news (good or bad).

[17] Charest (1978), p. 306.

period of –0.69 percent. He also recorded an increase in the volatility of share prices over the 24 months following the announcement of a dividend reduction. He commented[18]:

> *We can provide no tested explanation as to why this would be the case. We can reason though that the implicit leverage of a stock generally increases when its price falls. Since dividend decreasing stocks see their prices fall quite a bit on the average, we can thus expect an upward reassessment of risk of such stocks.*

However, investigation of post-announcement drift in abnormal returns was not a feature of dividend signalling research in the 1980s even though Charest (1978) had erected a signpost to it. It was not until the mid-1990s that interest in the topic was properly kindled. However, this aspect of dividend signalling remains outside the purview of this thesis.

2.2.2.3 Other Papers in the 1970s

Using CRSP and COMPUSTAT data on 310 firms drawn from 1946 – 1967, Watts (1973) set out to determine empirically if dividends actually did function as a signal of upcoming earnings performance. He noted that previous researchers from Lintner (1956) onward were operating on the tacit assumption that the information content of dividends was an incontrovertible item of fact. In his introduction, he drew attention to the fact that this 'information hypothesis' was even widely recognized in texts on financial management. His regression of a time series of 'future' earnings on lagged variables representing current and past earnings and dividends, furnished a positive but weak connection between current dividends and future earnings; but that it was insufficient for the earning of anything more than trivial profits by investors. This gave Miller and Modigliani's (1961) contention scant support. Watts dismissed the information content of dividends as economically inconsequential.

Similarly, Gonedes (1978), using a COMPUSTAT and CRSP 285-firm data set from 1946 – 1972, found that dividend announcements contained little information not contained in other contemporaneous announcements such as disclosures of extraordinary items. Gonedes' approach was to compare the behaviour of the forecast error term at time *t* available from a version of Lintner's (1956) model with changes in management's predictive distribution of income for periods beyond time *t*. If there was unique information in the dividend announcement, then changes in the error term would be positively correlated with changes in income for periods beyond period *t*. But this was not the case.

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[18] Ibid, pp. 307 – 308.

Concurrently with Fama, Fisher, Jensen and Roll (1969), Fama and Babiak (1968) had probed the nature of dividend setting by regressing dividend data from 392 firms drawn from a 19-year period 1946 – 1964 on prior observations as lagged variables . They found a significant relationship between announced and lagged dividends which implied that managers had a preference for relatively stable dividends smoothed towards a target payout ratio as explained by Lintner (1956). Therefore dividends could not be said to follow a random walk: they were systematically related to each other. This did imply, at a remove, that managers cared about what investors interpreted a dividend announcement to mean. Fama and Babiak followed Lintner in using change in earnings from period to period as their measure of share price return.

Ross (1977) produced a general incentive-signalling model which was tested empirically with respect to dividends by Kalay (1980). Kalay, however, was unable to refute the existence of an information content or signal conveyed, in particular, by dividend cuts, since most of his sample of dividend-cutting firms cut their dividends at management's discretion as distinct from involuntarily in response to constraints imposed by debt covenants.

Two years earlier Charest (1978) had commented in a footnote upon a dividend-cutting behaviour which was strongly in line with Lintner's finding concerning managers' preference for a smooth transition to a target dividend payout ratio; and which also can be construed as providing roundabout evidence for the existence of dividend signalling. This behaviour was a reluctance to instigate what would essentially be a 'bad-news' announcement. Charest noted[19]:

> *It was not uncommon for managers to break a stable dividend pattern by first delaying somewhat the announcement of the 'normal' dividend and then reducing or omitting the subsequent dividend. In such a case the time at which the delay becomes evident, not the delayed announcement, can be interpreted by a sharp trader as the point of dividend change.*[20]

However Charest was unable to go further than merely 'entertain the suspicion' that dividend increases and decreases transmitted information to investors on the ground that he was unable to separate the effects of earnings announcement and other confounding, synchronous announcement effects from that of the dividend announcement.[21] Papers which were later to overcome the problems of this synchronicity are examined in Section 2.2.6 of this review.

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[19] Ibid, p. 299, Footnote 2.
[20] This point was taken up by Kalay and Loewenstein (1986), who confirmed the existence of a positive relationship between size of dividend reduction and the length of the delay of its announcement from the expected disclosure date.
[21] Charest (1978), Op. Cit 17, p. 306.

2.2.3 Dividend Signalling Theory: A Green Light for Research into Dividend Signalling

2.2.3.1 Towards a Theory of Dividend Signalling

Thus far in the research record, abnormal and excess returns associated with dividend announcements had been found; and post-announcement drifts had been recorded. It was inevitable that dividend announcement research would become recognized as a topic in its own right. This inevitability was underlined by Asquith and Mullins (1983) who tabled a set of raisons d'être for it. Further, a number of influential analytical papers provided a coherent tap root for a theory of dividend signalling

2.2.3.2 Why Undertake Dividend Signalling Research?

A succinct justification for dividend signalling research was provided by Asquith and Mullins (1983). They listed the following propositions[22]:

1. Dividends are a transmission medium capable of broadcasting a signal to investors from managers concerning the latter group's beliefs about the recent performance of their company and its future prospects.
2. The signal transmitted in a dividend announcement provides a simple-to-understand company financial fitness report which is comprehensive in nature. On the other hand, other forms of company announcement, which tend to focus narrowly on some specific, specialized detail, lack this comprehensiveness.
3. The announcement of a dividend obliges a firm to make a transfer of some of its wealth to the control of the shareholder — in the form of 'cold hard cash.' This transfer must either come from reserves the firm has on hand, or from funding newly raised in capital markets from investors who will only invest if they believe the company's future prospects justify investment.
4. Dividend announcements are highly visible compared with other announcements.
5. Dividends, once initiated, become a periodic event upon which investors may come to rely. This differentiates the putative signal contained in dividend announcements from signals of a similar nature provided by the announcement of share repurchases, which tend not to have a regular, predictable timetable.

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[22] Asquith and Mullins (1983), p. 94.

2.2.3.3 Theoretical Models

Bhattacharya (1979) developed a model based on the idea that the costliness to itself of a firm's dividend payment made it a creditable signal of the firm's financial outlook. Indeed, firms with profitable investment projects would be able, and keen, to pay higher dividends in order to segregate themselves from firms with less profitable prospects. Bhattacharya argued that when investors had only a short investment horizon, dividends would be high relative to expected earnings; but if investors intended to hold shares over longer periods, then the equilibrium ratio of dividends to expected earnings would be lower.

Miller and Rock (1985) picked up the concept of costliness and argued that the relative cost of signalling any particular level of earnings would increase as the level of actual earnings achieved by a firm decreased. Noting that information asymmetry gave managers latitude to signal either correctly or duplicitously, Miller and Rock maintained that signalling would be worthwhile for profitable firms since the costs would be worth the effort of ensuring the market did not undervalue their shares. Conversely, the relatively higher cost of duplicitous signalling would be counter-productive for companies whose profitability was under threat. This latter proposition was countered by Ghosh (1993) who developed a theory of regret.

A third signalling equilibrium model on this theme was produced by John and Williams (1985) who incorporated taxes and the concurrent issues of new shares. This equilibrium existed when, on the one hand, managers controlled dividends at an optimal dividend per share, and, on the other, investors paid the correct price in the market for the firm's stock.[23] John and Williams argued that managers with undisclosed inside knowledge of the firm's robust prospects would use the signalling function of a dividend announcement in order to raise the share price so that when their firm issued new equity it could gain the benefit of a richer cash inflow. At the same time, the number of new shares issued would be minimized, thereby minimizing the dilution effect on current shareholders' holdings. Dilution was a key variable.

John and Williams' model allowed for differences among firms in the marginal benefit to insiders of paying dividends. In the case of firms with excellent undisclosed prospects, investors would benefit from increased dividends and market-price-driven decreased dilution. These benefits would be balanced out, at equilibrium, by the increase in the personal taxes they would have to pay on the dividends received. In the case of firms with inferior undisclosed prospects,

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[23] John and Williams (1985), p. 1054.

the cost of a larger than appropriate dividend would wipe out any net benefit from reduced dilution. From this, the authors argued[24]:

> *Consequently, there exists in the market a pricing function for stock that separates firms with more favorable inside information from those with less. In the resulting signalling equilibrium, firms with more favorable inside information optimally pay higher dividends, other things equal, and receive appropriately higher prices for their stock.*

The authors also argued that a firm in the posited state of equilibrium might, in fact, use new issues to both raise finance for project investments and also to fund the dividend. A couple of years later, Ambarish, John and Williams (1987) extended this dividend signalling model to link dividend signalling with both new share issues and capital investments.

Hakansson (1982), on the other hand, provided an analysis of the information content of dividends in terms of a series of expansions of the dividend irrelevance proposition of Miller and Modigliani (1961). The propositions in Hakansson's paper demonstrated that dividends do not provide useful new information when investors hold a homogeneous belief set; but if investors are heterogeneous in their beliefs, then dividend announcements do send a powerful signal.[25]

In a paper documenting a behavioural analysis of managers, and which drew its data from a questionnaire survey, Ghosh (1993) posited a line of reasoning which reinforced the role of dividend signaling as a concept not regarded lightly by company insiders. Calling his line of reasoning a theory of regret, Ghosh advanced the proposition that managers in making dividend payout rate decisions with uncertain outcomes would experience regret if the outcome was worse than that of an alternative strategy, and pride, if it turned out to be superior. He proposed that a critical variable influencing a manager's course of action was his or her subjective probability of success, where success or failures were measured as deviations from standard practice.

From the responses to his questionnaire, Ghosh found that managers tended to reveal risk aversion in cases where they had a choice between paying a dividend now or cutting it now in order to achieve possibly greater profitability later via its redeployment now into the company's investment projects. Risk aversion in this instance entailed playing safe with the dividend, and borrowing from external sources to fund investment. Conversely, Ghosh's managers became risk-seeking when deciding dividend strategy in the context of losses. On average, they preferred to sustain on-going payments of high-risk dividends with borrowed funds. A refusal to cut dividends during periods of poor earnings enabled them to feel proud of their actions

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[24] Ibid, p. 1054.
[25] Hakansson (1982) p. 427.

retrospectively if their companies survived the difficulties and subsequently returned to profitability with stock price unscathed. Hence in both profitable and in unprofitable circumstances, managerial preference was for at least maintaining existing dividends — whether this be a risk-seeking or risk-averse course of action in the given context.[26] The implication which may be drawn from Ghosh's study is that managers appeared to be forging survival strategies, with the importance of the signaling function of a dividend announcement as a factor kept strongly in their minds.

2.2.4 Short-term Price Effects Explored with the CAPM (Market) Model

2.2.4.1 Subsection Introduction

How actually did dividend announcements impact on share prices in the short term? If a signalling function was expected by investors, their immediate trading behaviour could be expected to push a firm's share price upward or downward depending on their interpretation of the signal they believed was transmitted. If the signal implied future prosperity, then increased market demand would result in an increase in value. A signal with pessimistic implications would, conversely, decrease a share's market price. This price effect was largely captured in the behaviour of abnormal returns (ARs) and cumulative abnormal returns (CARs) generated by the Market Model. In terms of the evolving tree of research into a theory of dividend signalling, this is the tree's main trunk.

The short-term impact research record is dealt with under several subheadings. Subsection 2.2.4.2 covers the extreme forms of announcement: the disclosure of dividend initiations from a background of a history of no dividend payments, and the disclosure of a cessation of dividends where the firm has made a tradition of distributing regular dividends. Subsection 2.2.4.3 then looks at papers in which increases and decreases relative to prior dividend distributions are examined. Subsection 2.2.4.4 then covers papers focusing on announcement-event induced share price volatility, while Subsection 2.2.4.5 looks at the impact on announcement-event abnormal returns of pre-existing price volatility and direction of price trend. Subsection 2.2.4.6 then takes into account the influence of company size, while Subsection 2.2.4.7 looks into intra-day price adjustments and finally, Subsection 2.2.4.8 deals with a paper examining the special case of

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[26] The line of thinking in which potential or actual losses produce risk-willing financial decision-making while receipt of positive gains fosters relatively risk-averse decision-making has been explored extensively over the past thirty years. One of the seminal papers in this genre was Daniel Kahneman and Amos Tversky's paper, "Prospect Theory: An Analysis of Decision Under Risk" in Econometrica, March 1979, Volume 47, No. 2., pp. 263-291.

Japanese announcements where forward earnings and dividend projections are bundled up with current earnings and dividend disclosures.

2.2.4.2 Impact of dividend Initiations and Omissions

The first major empirical paper was Asquith and Mullins (1983), cited in Section 2.2.3.1 above. These authors examined the price behaviour of 168 NYSE- or ASE-listed firms initiating dividends after no prior dividend payouts, or at least none in the previous ten years.[27] The dividend announcement data was obtained from Moodys' Dividend Record, Standard and Poors' Dividend Record, the Wall Street Journal and from the Centre for Research in Security Prices (CRSP). The announcements were drawn from between the end of 1963 and 1980, which meant that the ten-year screening period extended back to the start of 1954.[28]

Asquith and Mullins found the positive impact on share prices to be greater for firms which had not made earnings announcements either contemporaneously or within ten days of the dividend announcement as distinct from firms which did make such announcements. The subsample of firms issuing non-contemporaneous announcements furnished two-day excess returns of 4.7% ($t = 5.88$), while the equivalent result for firms issuing earnings announcements jointly or within the ten-day window was 2.5% ($t = 3.08$). The fact that a subsample of firms which had made other types of announcement either at the same time or within the ten-day window produced an even smaller, less spectacular result (1.6%, $t = 1.78$) enabled Asquith and Mullins to conclude that "other information appear[ed] to negate the impact at [sic] the dividend announcement by reducing the information content of the dividend announcement".[29]

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[27] Asquith and Mullins (1983), op. cit. 22, pp. 79 – 82) noted that the disagreement among empirical studies, up to their time of writing, as to whether dividend announcements contained unique information stemmed from three sources. The first of these was inadequate recognition and control of other announcements, such as earnings announcements, occurring concurrently with the dividend announcement.
The second source was the difficulty of isolating and controlling for investors' expectations. Asquith and Mullins noted that prior studies tended to assume that any change in dividends was unexpected (a "naïve dividend expectations model"). They circumvented this problem themselves by concentrating on dividend initiations on the ground that initial dividends are likely *not* to have been expected.
The third source of disagreement among prior studies is the relationship existing between the magnitude of dividends and the wealth effect. "Our results … suggest that previous studies may have underestimated the wealth effect of subsequent dividend increases." The underestimation itself stemmed from a failure to determine with any accuracy investors' expectations of dividends and from a failure to incorporate as a measure of the magnitude of dividend changes. Asquith and Mullins posed dividend yield and the size of dividend payout as appropriate 'size' variables.
[28] Ibid p. 83.
[29] Ibid p. 89. While Aharony and Swary (1980) demonstrated that dividend and earnings announcements were not perfect substitutes, Asquith and Mullins concluded that their own results indicated the two types of announcement may be partial substitutes with respect to information content.

Asquith and Mullins also recorded a positive and significant relationship between the magnitude of an initial dividend and the size of the excess return on the announcement day.[30] Further, the authors noticed, once adjustments had been made for differences in the magnitude of ensuing dividend announcements, that subsequent dividend increases had an even larger effect. This was consistent with the presence of unique, valuable information inside the announcements. The positive impact of dividend initiations was reconfirmed by Wansley and Lane (1987).

Healy and Palepu (1988), using 131 firms from Asquith and Mullins' (1983) 168-firm 1969-1980 sample, found that statistically significant abnormal returns (called market adjusted returns derived from CRSP equal-weighted market returns) were generated over not only the announcement and preceding day, but also over the first ten-day period following the announcement. However, returns beyond the tenth day after the event were statistically insignificant. On the other hand, the returns from three holding periods spanning the 60 days preceding the announcement were significant as well.[31] Healy and Palepu concluded that this was evidence of investors anticipating the nature of the dividend announcement from other information sources in advance.[32]

Healy and Palepu also observed the abnormal returns associated with dividend omissions. In this instance they used 172-firm observations from 1969-1980, and again obtained from CRSP and COMPUSTAT. In this instance, the abnormal returns were significant and negative on the announcement and immediately preceding day, and over the three holding periods spanning the preceding 60 days. However, neither the ten-day span following on from the two-day event period, nor the ten-day span after that yielded statistically significant results, although the recorded returns continued to be negative.[33]

Ghosh and Woolridge (1991) focused on the impact of successive dividend omission announcements as a test for the information content of dividend announcements. They argued that the market reaction to consecutively occurring announcements should dwindle as non-payouts came to be expected. Ghosh and Woolridge found that the first announcement tended to be associated with a statistically significant drop in share price, and that ensuing announcements did not have a significant impact.

Phillips, Baker and Edelman (1997), studied the market's reactions to discontinuation of stock dividends (known in New Zealand as bonus shares) by NYSE and AMEX-listed companies.

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[30] Ibid, p. 91.
[31] Healy and Palepu (1988), p. 156, Table 2.
[32] Ibid, p. 157.
[33] Ibid, pp. 156 – 157.

Generally firms that discontinued stock dividends generated statistically insignificant abnormal returns at the time of the announcement. However, a concurrent declaration of an increased cash dividend overwhelmed this tendency by generating significant positive abnormal returns.

2.2.4.3 Impact of Dividend Increases and Decreases

Divecha and Morse (1983) hypothesized that an announced increase in dividend payout would convey more favorable information to the market than an announcement of a decrease — if the increased payouts were associated with financing investment with externally generated funds. These authors observed the Abnormal Returns (ARs) generated by shares of 668 NYSE companies making 1039 payout change disclosures between May 1977 and February 1979, and found that firms in the increased-payout category did earn higher positive ARs than their payout decreasing counterparts. Divecha and Morse also found that a rise in dividend and a fall in payout ratio produced higher ARs than a rise in both variables.

By way of contrast, Woolridge and Ghosh (1985), reporting case studies of two US companies, Gould Inc. and ITT in 1983 and 1984, showed that a company which announced a decrease in dividend payout could actually increase its share price on the day the cut was announced. The necessary condition for this outcome was a prior publicity campaign about the need for internally generated funds for a major investment project.

Penman (1983) was another paper confirming that dividend announcements produced statistically significant excess returns on the date of the announcement and on the preceding day.[34] Further 1980s decade empirical papers investigating the share-price-based market reaction of changes in dividends include Aharony and Swary (1980), Woolridge (1982), Benesh, Keown and Pinkerton (1984), Dielman and Oppenheimer (1984), Eades, Hess and Kim (1985), Roy and Cheung (1985), Aharony, Falk and Swary (1988), and Fehrs, Benesh and Peterson (1988).

In the 1990s, there were a number of interesting papers. Impson (1997) investigated the difference between American public utilities and unregulated firms and found that investors punished utilities more severely for announcing dividend decreases than they did unregulated firms. He ascribed this phenomenon to two things. In part, it was a result of investors having segregated themselves into a clientele requiring high dividend yields, which then reacted to the lowering of those yields. And in part it was a reaction to the signalling of poor future earnings by

[34] Penman (1983). See Table 6, p. 1194. Announcement Day (day zero) and the preceding two days furnish significant excess returns according to a *t*-test, but Day_{-2} loses its significance under an alternative cross-sectional correlation test.

a firm type whose earning power was bounded by statutory authority and therefore more restricted than that of unregulated firms.

Waller, Bendeck and Bhargava (1999) examined the information content of sequences of multiple dividend reductions by a small and rather specialized sample of 284 firms fitting this announcement behaviour and listed on the NYSE from 1971 to 1989. Using a measure of standardized earnings changes (SEC), they showed that announcement-period abnormal returns were significantly related to SEC over the first two post-announcement years. In other words, a subsequent dividend reduction contained two years worth of information about future earnings performance. The authors concluded that the share price response depended on the timing of this subsequent reduction relative to the initial reduction.[35]

While by the mid 1990s it was generally well established that a firm's announcement of a dividend reduction would be punished with a lowered share-price by the market, there was still room for debate as to what this price-drop would be, and how it would differ over different magnitudes of announced dividend reduction.

This issue was addressed by Christie (1994), who observed the effect of magnitudes of dividend reduction expressed as percentages. Christie found a U-shaped relation instead of the expected monotonic relation in which the share price punishment associated with omissions should exceed that of the worst percentage reduction. Indeed, dividend reductions of less than 20 percent elicited an average price fall of 4.95 percent, while reductions exceeding 60 percent (but less than 100 percent) engendered a fall of 8.78 percent; but the total omission of a dividend brought about an average fall of only 6.94 percent.[36] Christie's ensuing tests of investment-opportunity-related and distress-related explanations of this U-shaped phenomenon were unable to account for it. His data set was 492 dividend omission announcements and 475 announcements of dividend reductions made by NYSE- and AMEX-listed firms between July 1962 and December 1985.

Amihud and Murgia (1997) provided a valuable contribution to dividend signalling research by showing, with respect to the behaviour of German firms and investors, that dividend signalling occurs even when dividends are taxed at a rate equal to or less than the rate on capital gains in the hands of investors. The finding of statistically significant averaged excess returns on days t_{-1} and t_0 at the time of a dividend announcement effectively scuttled Bhattacharya's (1979) argument that (relatively high) taxes were a necessary condition, in terms of his model, for

[35] Waller, Bendeck and Bhargava (1999), p. 44.
[36] Christie (1994), p. 460.

signalling to occur. Nevertheless, they noted that Bernheim and Wantz (1995) had shown that tax was an active ingredient in the signalling process.

Germany, in the period under observation,[37] had a system of imputation credits in place. Hence, the company paid tax on income at the company rate, while investors paid tax on any dividends they received at their own marginal rate. Where (with a partial exception in the case of foreigners) an investor's marginal tax rate was below the company tax rate, the investor received the difference in the form of a tax credit.

Further, German firms tended to announce their dividends at a later date than their announcements of earnings. Amihud and Murgia concluded that the content of the dividend signal definitely related to current earnings. They pointed out that earnings announcements would tend, in the German context, to provide an insufficiently clear picture of company health as German accounting standards allow for much less disclosure.[38]

Travlos, Trigeorgis and Vafeas (2001) found ARs and Cumulative Abnormal Returns (CARs) associated with dividend announcements made on the Cyprus Stock Exchange but were unable to determine with much confidence whether the announcement of cash dividends contained a signal relating to improved future levels of earnings or not.[39]

2.2.4.4 Impact on Post-announcement Price Volatility

Sant and Cowan (1994) found that the volatility of returns on a firm's share price increased significantly in the aftermath of the omission of a dividend. Similarly the firm's beta, the variance of actual earnings and the dispersion of analysts' earnings forecasts became larger. This confirmed Charest's (1978) finding with respect to announced dividend reductions; and was in keeping with Venkatesh's (1989) recording of a reduction in volatility in conjunction with dividend initiation announcements.

2.2.4.5 The Impact of Pre-existing Price Volatility on Announcement Period Abnormal Returns

Docking and Koch (1999) investigated the relationship between stock returns to investors and the market context in which the dividend announcement was made. What they measured was the sensitivity of mean cumulative abnormal returns (MCARs) associated with dividend announcements to a measure of recent market trend and also to a measure of share market

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[37] Amihud and Murgia (1997). The period investigated was 1988 – 1992.
[38] Ibid, p. 397.
[39] Travlos, Trigeorgis and Vafeas (2001) used 181 cash dividend announcements on the Cyprus Stock Exchange and its less formal forbear in the period 1985 – 1995. These announcements were made by 31 firms.

volatility over the same lead period. Initially they partitioned their 1962 – 1997 sample of 4,344 NYSE, AMEX and NASDAQ company announcements separately by recent trend and then by recent volatility. This, however, yielded no significant results. But Docking and Koch did find significant systematic amplifications in their measured MCARs when they partitioned their sample by both market variables simultaneously.

The trend and volatility variables were measured over a period of 29 days prior to the announcement (t_{-30} – t_{-2}) while the MCARs were measured over days t_{-1} and t_0. Trend was measured in terms of the period's mean, and volatility was captured by its standard deviation; and both were divided into three levels. The top quartile of market means were classified as being the *up* market, while the middle two quartiles represented the *normal* market and the lowest quartile was the *down* market. The market volatility variable was classified in a similar manner into *high*, *medium* and *low* volatility.

Docking and Koch found that MCARs associated with dividend-increase announcements made when the market had *high* volatility and *normal* or *low* market direction were significantly larger than when the market had *medium* volatility and an *up* trend. Similarly, dividend decreases partitioned simultaneously by the two market measures produced amplified negative MCARs in the *up-high* market category which were significantly different from those in the *up-medium*, *up-low*, *normal-high*, *normal-medium*, *normal-low*, *down-high and down-medium* categories.

Further, on a sample of 2,221 announcements for which data for six explanatory variables were available, Docking and Koch found that the cumulative abnormal returns (CARs) associated with dividend increases were significantly related to the size of the firm (as measured by the log of the market equity). This relationship between company size and CARs drowned out the importance of a book-to-market ratio variable which was significant when the sample was partitioned by volatility alone. Size was also important when the sample was partitioned by market trend alone. In this instance it was significant when there was an *up* market or a *down* market. With respect to the *down* trend, larger firms generated larger CARs than did smaller firms upon increasing their dividend. When the market trend was *normal*, dividend yield was significantly related to the CARs.

This clear picture with respect to the role of company size on CARs in the presence of trend and volatility tended to disappear when Docking and Koch turned their attention to announcements of dividend decreases. When these were partitioned by market direction alone, dividend yield was significant and negative with respect to CARs in all three directional categories. Size was important in the *down* market; and both size and book-to-market ratio were significant when the market direction was *normal*.

When the partitioning of dividend-decrease announcements was done on volatility in isolation, dividend yield again was significant over all three categories, while size had significantly positive relationship with CARs in the *medium* and *low* volatility markets. Size was replaced by a significant negative relation between CARs and book-to-market ratio when volatility was *high*.

When the dividend-decrease sample was partitioned by both market variables, dividend yield was significant and negative under *up-high* and *down-high* (direction-volatility) conditions. However, the book-to-market ratio was the most important explanatory variable under the *normal-high* market configuration.

2.2.4.6 Abnormal Returns and the Company Size Effect

Towards the end of the 1980s a number of papers investigated the linkage between aspects of dividend signalling and firm size. In the United States, Eddy and Seifert (1988), using market value of a firm's common stock as a proxy for the size variable, and Ghosh and Woolridge (1988), using the log of the market value of outstanding shares as their proxy, found that the dividend announcements of small firms tended to produce larger abnormal returns than those yielded by larger companies.

Bajaj and Vijh (1990) observed the relationship between dividend announcement effects and firm size with respect to Miller and Modigliani's (1961) concept of the existence of dividend-sensitive clienteles. Then also examined the connection between dividend announcement surprises and dividend yield surprises (which are generally inseparable).[40] They found that both phenomena were associated with larger measures of ARs for the lower-priced shares of small CRSP-listed companies than for large companies. This was because the presence of higher transactions costs would be likely to produce a stronger yield surprise effect while the relative lack of information produced at other times by such firms would intensify the information effect.

Haw and Kim (1991) found that the smallest-sized firms in their study returned the highest ARs of all, but that these returns did not decline monotonically as the size of the firms observed was increased.[41] Further, when they observed the impact of their company size variable on ARs associated with announcements of dividend decreases, it was only marginally significant.[42] The

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[40] Bajaj and Vijh (1990), p. 195: "… [D]ividend surprises are perfectly correlated with dividend-yield surprises. Dividend-yield surprise is simply the dividend surprise divided by the preannouncement price."
[41] Haw and Kim (1991), p. 338.
[42] Ibid, p. 340.

authors also recorded an increase in dividend yield of 1 percent associated with a 1.98 percent increase in AR on announcement date.[43]

Across the Atlantic Ocean, Lonie, Sinclair and Power (1992) reconfirmed the finding by Chowdhury and Miles (1987) that small United Kingdom companies reduced their dividends more readily than their larger counterparts when under financial stress. Another UK paper, Fox and Green (1992) noted that small companies tended to have lower payout ratios than large companies. Further UK work was produced in this area by Marsh (1993). Abeyratna (1994) found that the earnings and dividend announcements of small UK companies tended to generate greater ARs than those of large UK firms. This was in line with the argument that small firms' dividend announcements are more likely to have a greater surprise element to them (relating to the lesser likelihood of prior publicity in the financial media).

Bajaj and Vijh (1995) investigated the role of company size in the occurrence of announcement-related excess returns, volatility and excess trading volumes. They found indeed, that smaller firms tended to furnish relatively larger measures of all three variables. However, contrary to Kalay and Loewenstein's (1986) finding that the rise in systematic risk (measured by beta) during the announcement period was too small to account for excess returns for firms generally, Bajaj and Vijh determined with a weighted least squares regression that the increased riskiness of smaller companies explained observed announcement period excess returns with a 1 percent likelihood of a type one error.[44] They found a similarly strong relation between risk and excess volume with respect to firm size. They concluded that the investors who set the share price in and about the announcement period were 'information-motivated' and at least partially operating on private information. Also the excess returns they generated were viewable as 'compensation for the risk borne during the information production'.[45]

2.2.4.7 Intra-day Price Adjustments

Patell and Wolfson (1984) observed the intraday speed of adjustment of share prices to earnings announcements and to dividend announcements on 96 firms listed on either the NYSE or AMEX in 1976 and 1977. While unchanged dividends elicited no response, these researchers found a significant ultra-short-term price reaction to earnings announcements and announcements of changes in dividend. This price reaction passed its peak within the first fifteen minutes of an

[43] Ibid, p. 339.
[44] Bajaj and Vijh (1995), p. 274.
[45] Ibid, p. 277.

announcement's publication. They found that the serial correlation associated with these announcements tended to extend into the following day.

2.2.4.8 The Special Case of Japanese Announcements

Conroy, Eades and Harris (2000) conducted an analysis of 3,890 joint dividend-and-earnings announcements of companies listed on the Tokyo Stock Exchange over a period spanning 1988 to 1993. This study was of interest because Japanese listed companies not only disclose their annual earnings and dividends jointly, but also bundle this with a formal estimate of projected earnings and dividend one year into the future. Furthermore, these disclosures are preceded in the Japanese financial press by analysts' predictions of all four components of the compound announcement. The authors employed four measures of surprise (for current earnings, current dividend, and next year's earnings and next year's dividend) based on the difference between company figures and preceding analysts' predictions; and their two-day cumulative abnormal returns spanning the announcement period (t_0 and t_1) were cumulated from returns on holding a share minus returns on a suitable equal-weighted market index.

Given the wealth of evidence in the research record, in general, of the impact of earnings announcements on associated CARs, it was unsurprising that Conroy et al found that both current and next-year projected earnings produced statistically significant positive CARs; but it was interesting that current dividends were not significantly related to CARs of any sort. Instead, it was the one-year forward dividend projection that produced a significant and positive relationship. This configuration of results held up robustly when tested for sensitivity to a number of Japanese market-related phenomena including the preponderance of 'keiritsu' or mutually interlocked companies in the Japanese business world.[46] Conroy et al interpreted their results as support for Miller and Modigliani's proposition of dividend irrelevance. However a possible alternative interpretation might have been that investors in Japan were turning to the formal forward projection for the information signal that in other countries is furnished by the announcement of the current dividend only. Conroy et al did not discuss this possibility.

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[46] Conroy, Eades and Harris (2000), p.1202. The authors describe the keiritsu phenomenon as a grouping of companies bound together in an industrial grouping with strong horizontal and vertical linkages. This is cemented by the nature of each constituent company's board, which is interlocked with all of the others by the fact of sharing directors drawn from the same pool of keiritsu insiders. Further, each keiritsu has at its centre, a financial institution such as a bank, which meets most of the group's financing needs, thereby reducing the need for raising cash via issues of securities of any sort to outsiders.

2.2.5 The Relationship between Dividends Announced and the Quality of Earnings

2.2.5.1 Section Introduction

In Section 2.2.4, the relationship between the dividend announcement and short-term changes in share prices was observed and discussed. That section provided evidence that investors did indeed react to something contained within the announcement; and that this reaction entailed the buying or selling of the firm's shares. But why should they bother? They would only do this if there was information implied in the dividend announcement to which they lend some credence. The information investors are most likely to base their desire for investment or disinvestment on is information about the firm's future earnings prospects. In this new section, the evidence of a connection between the dividend announcement and real changes in company earnings levels is examined. In Subsection 2.2.5.2, the connection with past and current earnings is observed. In Subsection 2.2.5.3, attention is directed to the connection between the dividend announcement and future earnings. In Subsection 2.2.5.4, the variable, future earnings is used as a means of identifying categories of dividend announcement. In Subsection 2.2.5.5 the connection between the dividend announcement and future earnings volatility is examined.

2.2.5.2 Relationship with Past and Current Earnings

That there should be a connection between the level of an announced dividend and the firm's ability to pay it at the time the payment falls due is common sense and unremarkable. Nevertheless, this connection needed to be formally established, and indeed was established by Lintner (1956).

The connection was reconfirmed by Fama and Babiak (1968). They subjected change in dividends (as dependent variable) to a number of regressions in which current and subsequent earnings, cash flow, and capital expenditure, and even prior-period dividends were employed as independent variables. Of particular relevance was their confirmation of a statistically significant relationship between announced dividends and current earnings. Fama and Babiak's share price return measure, which was to become pretty much the standard in ensuing research, were ARs and CARs generated by the Market Model.[47]

Penman (1983) observed the predictive content of dividend announcements and compared them with the predictive power of earnings forecasts made by the given firm's managers. He found

[47] Pettit (1972), pp. 995 – 996.

that forecasts based on dividends were more accurate predictors of current earnings performance than were forecasts of earnings directly.[48]

2.2.5.3 The Relationship between Dividends Announced and the Quality of Future Earnings

In terms of dividend signalling, an insight into the nature of future earnings would be much more valuable to investors than just information about current earnings. There is now quite a rich record of papers in which faith in the existence of that insight appears to be justified. I start with Ofer and Siegel (1987).

Ofer and Siegel determined that unexpected changes in dividends signalled information concerning future earnings. Ofer and Siegel used 781 dividend events and associated share price data from CRSP in conjunction with earnings forecast data provided from the Investment Brokers Estimate System data base (IBES) covering NYSE and AMEX firms in the period 1976 – 1984. The focus of their observation was the change in analysts' earnings forecasts occurring as a result of receipt of the dividend announcement. They showed that an unexpected dividend change did provide cues to analysts who altered their forecasts to rationally incorporate the information interpreted as residing in the dividend change. Ofer and Siegel found that the analysts' earnings forecast errors displayed systematic errors in advance of the announcement of an unexpected dividend change; and that in the ensuing time interval between that announcement and the firm's point of disclosure of actual earnings, the systematic element in forecast errors disappeared. This result suggested that Ofer and Siegal's analysts were picking up a signal from the dividend announcement concerning the firm's expected earnings performance.[49]

Healy and Palepu (1988), who had obtained a sample of 131 initiation announcements and 172 omission announcements and who had reported the generation of abnormal returns associated with both announcement types (discussed in Subsection 2.2.4.2) also systematically observed the relationship between each announcement and annual earnings for the preceding five years (ie, t_{-5} to t_{-1}) and the ensuing five years (t_0 to t_4), where the standardized measurement of annual earnings was the difference (deflated by the share price recorded two days before the dividend announcement) between earnings for year t and the previous year's earnings figure.

With respect to the initiation announcements, Healy and Palepu found that earnings changes in the year running up to the announcement (t_{-1}) were positive and statistically significant; and that

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[48] Penman (1983), Op. Cit. 42, p. 1185.
[49] Ofer and Siegel (1987), p. 906.

the earnings growth continued in the year starting with the announcement (t_0) and the following two years.[50] With respect to their dividend omission sample, the authors found statistically significant earnings changes in all years over a five-year span starting from two years before the announcement date (t_{-2}) through to three years afterwards (t_0, t_1 and t_2). As one would expect, the earnings changes recorded prior to the omission announcement data were negative in sign. What was of special interest was that the direction of the earnings change was reversed for the second and third years (t_1 and t_2) afterward. The earnings changes recorded in these years were significant and positive.[51] Healy and Palepu pondered that the two years of positive earnings changes might be attributed to a survival bias built into their data set by the fact that earnings data had to be available for a firm up to five years after the date of a dividend announcement.[52]

Healy and Palepu went on to examine as to whether the future standardized earnings mentioned above could be shown to be evidence of an actual signal picked up by investors from the dividend announcement. Their argument is as follows:

1. Abnormal returns at the time of the dividend announcement event are indicative of an investor reaction to an incentive (message) spurring them to buy or sell shares.
2. The changes in standardized annual earnings for years t_0, t_1, t_2, t_3 and t_4 are the message from the dividend announcement in their eventual confirmed outcome form.
3. A significant positive relationship between points (1) and (2) indicate that an information signal concerning future earnings was transmitted and received. The occurrence of the returns in (1) confirms that investors took up the message; and the occurrence of the earnings pattern in (2) confirms the message content.

In investigating the relationship between event period returns and future earnings, the authors also controlled for the impact of earnings changes in the immediately prior future period and for earnings information releases in the year leading up to the dividend announcement event. They ran a multiple regression for each year of future earnings data available. With respect to dividend initiations, standardized earnings changes (the dependent variable) were significantly related with event-period returns in the first two years (t_0 and t_1), but in none of the ensuing three years. With respect to dividend omissions, the first two years (t_0 and t_1) furnished similar results; and in

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[50] Healy and Palepu (1988) Op. Cit. 39, p. 159. See Table 3. It appears that the result for year t_1 is only marginally significant; but the result for year t_2 is much more strongly so. These results apply for both raw earnings changes and for earnings changes adjusted for industry type.
[51] Ibid p. 161. See Table 5. When earnings changes were adjusted for industry type, the earnings change for year t_{-2} lost its significant status.
[52] Ibid, p. 163.

year four (t_3) a significant negative relationship was recorded. With the exception of this last item (the year-four negative relationship) which is rather hard to interpret, these findings enabled the authors to claim that the information content of the dividend announcement did exist, was understood by investors with respect to the two years following the dividend announcement, and was acted upon.[53]

Olson and McCann (1994), who ran a logit regression reconfirmed that there is a linkage between dividends and earnings. They found that firms which used dividends as a signal tended to have a higher growth in asset turnover, to be smaller in size, have lower growth in sales, and to use less leverage than non-signallers. This tendency was intensified in the case of firms which followed both signalling and residual dividend policies.

DeAngelo, DeAngelo and Skinner (1992), using COMPUSTAT and CRSP data for firms reporting at least one annual loss in the period spanning 1980 – 1985, found that earnings tended to rebound substantially after the initial loss year, irrespective of whether the firm chose to reduce its dividend or leave it unchanged. However, the future earnings levels of dividend-reducing firms was significantly lower than those of the non-reducers.[54] Therefore the signal within the dividend reduction announcement could be interpreted as a reduction in expected level of future earnings. This enhanced investors' ability to use the firm's subsequently-announced current earnings as a predictor of its future earnings. The data set De Angelo et al used in this instance, was restricted to 167 NYSE firms with a record of a prior ten years of positive earnings and dividend payouts.

The next research findings of interest were furnished by Michaely, Thaler and Womack (1995). This paper was largely concerned with post announcement share price drifts. But with respect to future earnings, the authors provided evidence that an announcement of an increased dividend could be interpreted as signalling that the current level of earnings would be sustained into the future. The data set in this instance was made up of 1972 – 1988 quarterly earnings data (obtained from COMPUSTAT) which were compared with a subsample of associated dividend announcements from the 1964 – 1988 NYSE/AMEX data set of dividend initiating and omitting firms used more generally in Michaely et al's paper. The authors observed quarterly earnings

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[53] Ibid, pp. 165 – 169. Also see Table 7, p. 165.

[54] DeAngelo and DeAngelo (1992). These authors also published a paper two years earlier which, while empirically investigating the connection between financial distress and dividend policy with respect to 80 distressed NYSE firms, does not address the issue of dividend signalling. Nevertheless, they found that managers react to financial distress 'with rapid and aggressive dividend reductions' (p. 1430), and that managers prefer to reduce dividends rather than omit them altogether (p. 1424). See Harry DeAngelo and Linda DeAngelo, 'Dividend Policy and Financial Distress: An Empirical Investigation of Troubled NYSE Firms', *Journal of Finance*, Vol. 45 No. 5, December 1990.

figures for up to one year before and one year after the dividend announcement event. In particular, the quarterly mean earnings surprises associated with announcements of dividend increases were positive for all four quarters leading up to the event and continued to be so for the following three, but not the fourth.[55] In the case of dividend-decrease announcements, the pattern of quarterly earnings surprises was uniformly negative over the preceding year and likewise for the first three quarters in the year following on from the event.[56] With respect to earnings volatility, they found that dividend-increasing firms tended to enjoy greater long-term earnings stability than did a control set of unchanged-dividend announcers.

A related paper, Benartzi, Michaely and Thaler (1997) went on to find, however, that increases in dividends were predictors of a concurrent rise in earnings to a new sustainable level, but that there was no significant connection between raised dividends and any *growth* in earnings over the next two years. (Watts (1973) had concluded that the relation was statistically significant, but economically negligible.) Their regression sample contained 4,996 firm-year observations from the NYSE and AMEX in the period 1979 – 1991.

Nevertheless, Benartzi, Michaely and Thaler (1997) were able to corroborate Michaely, Thaler and Womack's (1995) finding that the shares of firms announcing increased dividends generated significant excess returns during both the announcement event period and over the following three years. Putting these findings together, they observed[57]:

> *This implies that if firms are sending a signal, (a) it is not a signal about future earnings growth and (b) the market doesn't 'get it' Why firms would burn money to send a signal that is not received is, indeed, a mystery.*

The apparent absurdity of the situation deepened with the results obtained from the researchers' observations of the growth behaviour of future earnings and excess returns associated with the set of dividend-reducing announcements in their sample. On the one hand, they observed a statistically significant pattern of earnings increases over the following two years — a finding in line with Healy and Palepu (1988) who found statistically significant earnings increases in the first two years after a dividend omission.[58] On the other, the three years following the announcement did not furnish significant excess returns. In other words, there appeared to be

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[55] Michaely, Thaler and Womack (1995), p. 590, Table 4, Panel A. An earnings surprise was defined as the difference between earnings before extraordinary items at time t_0 and the equivalent figure for four quarters earlier (t_{-4}), where this difference was deflated by the share price existing at time t_{-4}.
[56] Ibid, p. 590, Table 4, Panel B.
[57] Michaely, Womack and Thaler (1997), p. 1009.
[58] Healy and Palepu (1988), Op. Cit. 39, p. 162.

real content in the reduced-dividend signal, but evidently nobody was picking up that aspect of the signal.

Making use of Michaely, Thaler and Womack's (1995) data set to explore a possible informational difference between dividend initiations and dividend increases, Benartzi et al showed that dividend initiating firms did indeed enjoy strong earnings growth in the two years following the initiation announcement whereas no such growth was associated with announcements of mere increases. Both dividend reductions and omissions, however, were followed up with improved earnings growth (i.e., a strong earnings reversal) over the same interval.

It was inevitable that the work of Benartzi, Michaely and Thaler (1997) would attract ongoing attention. A major contribution in this respect was made by Nissim and Ziv (2001), using a 35-year data set (1963 – 1998).[59]

Initially Nissim and Ziv simply recalculated Benartzi et al's method on their current data set and obtained results very much in line with those that Benartzi et al had published — that future earnings in years t_1 and t_2 were unrelated to any dividend announcement at time t_0. However, Nissim and Ziv argued that these results, in the first instance, may have been bedevilled by a measurement error implicit in the dependent variable, 'change in earnings in year t',[60] as a result of reliance on the assumption that earnings in a given year were unrelated to earnings in the previous year. This assumption was tenable if undeflated earnings were being put under scrutiny, but not when the variable under scrutiny was a change in earnings figure that had been standardized by being deflated by the market value of equity in the preceding year (P_{t-1}). The market value of equity in the preceding period must definitely be correlated with the value of earnings in that period. Nissim and Ziv addressed the measurement error by replacing P_{t-1} with the book value of equity in the preceding year, B_{t-1}.

The second methodological issue, Nissim and Ziv argued, was that Benartzi et al, in calculating the relationship between future earnings and current dividends, had omitted an important explanatory variable — the ratio of earnings to book equity in the previous period, ROE_{t-1}. This

[59] Nissim and Ziv (2001), pp. 2113 – 2115 and Table 1. These researchers used monthly CRSP dividend information for NYSE or AMEX-listed companies, and supplemented this with accounting and market value data from COMPUSTAT, and with analysts' earnings forecasts from IBES. They started with 100,666 quarterly dividend observations provided by 2,216 firms; but given that more than one observation was possible in a year for a firm, this translated to a set of 31,806 firm-year observations.

[60] Ibid, p 2116. This variable was measured by $(E_t - E_{t-1})/P_{-1}$. Their solution was to replace the denominator, P_{-1} (market value per share of common equity in the preceding period) by B_{-1}, the book value per share of common equity.

variable was important, as research by Ohlson and Penman (1982) and Fama and French (2001) had shown not only that ROE was a predictor of change in earnings, but it was also mean reverting. Nissim and Ziv inferred from this that dividend changes, being positively aligned with ROE, would (all things being equal) be negatively correlated with the expected change in earnings. If this were true, then an identified absence of such a correlation would show that the announcement of a dividend change did contain future earnings information. Nissim and Ziv accordingly inserted ROE_{t-1} into their pooled regressions.

Nissim and Ziv found that dividend-increase announcements did indeed signal an increase in future earnings that was statistically significant over the following four years. On the other hand, announcements of dividend reductions, when controlled for current and expected profitability, were uninformative about future earnings. They explained this asymmetry in terms of a variable which occurred only in the presence of current losses and potentially ongoing future non-profitability — the managerial decision to take a once-only big bath.[61] Big baths in conjunction with the rebalancing of a firm's capital structure could facilitate a company's fairly rapid return to financial health. Nissim and Ziv's results were robust to a number of specifications of their variables.

DeAngelo, DeAngelo and Skinner (1996) set out to test the validity of the tenet that a dividend increase is a signal of future earnings growth by observing the dividend and price behaviour of NYSE firms which had had a history of at least 9 years of positive growth and dividend payouts followed from time zero onward by at least a four-year doldrums period of essentially zero growth. The dividend signal under scrutiny was the signal purported to be in the announcement made at time zero (t_0). The authors related this, for two categories of announcer, to the following four years of reported earnings. Of the 145 firm-announcements in the sample, 99 actually increased the t_0 dividend, while 44 left it unchanged from the previous period and only two firms (1.4 percent of the sample) reduced their dividend. The latter two categories were bundled as dividend non-increasers.

With respect to the dividend-increasing firms at t_0, DeAngelo et al recorded a statistically significant positive two-day CARs with a mean slightly larger than half of one percent of the

[61] A big bath entails maximizing the declaration of losses in the current accounting period in the hope of minimizing related future losses. Usually fixed assets will be overvalued in a company's balance sheet relative to their market value; and the big bath entails writing these down and declaring the write-down as a current period extraordinary loss. The benefit of such a move is that depreciation expense in future periods on these assets will be correspondingly lower.

share price.[62] This indicated the announcements in the sample did provide evidence of a signal; and that at least some investors did react to its good news content. However, in terms of CARs cumulated from 15 days before the announcement event to 15 days afterwards, the change in value of a share was miniscule (seven tenths of one percent). The authors interpreted this as indicating that investors over the month span as a whole, were neither impressed nor unimpressed with the company's future earnings prospects.[63] In other words, the signal was a pretty weak one.

When the cumulative earnings record for the ensuing three years (t_1, t_2 and t_3) were examined, DeAngelo et al's dividend increasers averaged an earnings decline of 8.2 percent, which was worse than the non-increasers' decline over the same period (7.0 percent). The two declines were individually statistically significant,[64] but the significance disappeared when they were directly compared. With respect, again, to the dividend increasers, the authors concluded that whatever signalling took place at t_0 could be attributed to several possible causes (listed as explanations 5 and 6 of a list of six in which the others were rejected)[65]:

> *5 Because managers tend to be overly optimistic about company growth, they send signals that are overly optimistic about future earnings.*
>
> *6 Managers make only modest cash commitments when they increase dividends, which undermines the reliability of such signals.*

The authors found that only twelve of the dividend-increasing firms in their sample had managers who behaved overly optimistically (reason 5), while the managers of a further 63 had announced dividend increases averaging only 3.5 percent of earnings (reason 6). DeAngelo et al argued that any signal furnished by such a modest increment would be too small to be a reliable predictor of future earnings as it would not allow firms with superior prospects to be differentiated from those with inferior prospects.[66] This conclusion was supported by their finding that the earnings performance of the dividend increasers could not be distinguished from that of the dividend non-increasers over the ensuing three years.

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[62] DeAngelo, DeAngelo and Skinner (1996), pp. 357 – 358. See Panel A of Table 5.
[63] Ibid, pp. 358 – 359. The dividend increases were seen as importing "at most a modest amount of new information that would justify a higher equity value".
[64] Ibid, p. 351. The dividend increasers' earnings decline was significant, in terms of the growth adjustment model employed, at the one percent level of error. The non-increasers' decline was significant at the five percent level of error. (See Table 2.)
[65] Ibid, pp. 342 – 343.
[66] Ibid, p. 386.

Lipson, Maquieira and Megginson (1998) picked up on and refined DeAngelo, DeAngelo and Skinner (1996) by focusing on a matched sample of dividend-initiating and non-initiating firms in the same industry that were recently listed on a stock exchange for the first time. The sample, drawn from 1980 – 1986 COMPUSTAT data, contained 99 dividend-initiators, for which earnings, sales and total assets data were available, and was matched with 99 non-initiators of equivalent size in the same industry.

Lipson et al found that the dividend initiators did indeed signal an increase in earnings in the next year that was statistically significant at the one percent level of error, but this dropped to the ten percent level when future earnings were industry-adjusted. There was no significant relationship between the dividend initiation and second year earnings. But when future earnings were re-specified as 'earnings surprises', dividend-initiating firms generated strongly significant first and second-year surprises while the non-announcers did not.[67] Lipson et al concluded that dividend initiating, newly-listed firms were taking the opportunity to signal their superiority over non-initiating rivals in the same industry niche who were also rivals for attention from the same investors. But like DeAngelo et al, Lipson et al found that the dividend commitment was a very small slice of company earnings — amounting to 5 percent.

Best and Best (2000) observed the individual and joint impacts of earnings and dividend announcements on earnings forecast revisions for NYSE/AMEX and NASDAQ firms over a fifteen-year period from January 1984 to December 1998. They found that dividend surprises[68] tended to have a statistically insignificant impact while the impact of earnings surprises were strongly significant for both revisions of current-year and next-year forecasts.[69] Best and Best employed a restricted regressions methodology similar to that of Kane, Lee and Marcus (1984), but cited test statistics computed from White's (1980) heteroskedasticity-consistent matrix in place of the F-tests used by Kane et al, Easton (1991) and Lonie et al (1996).

With respect to dividend-surprise-earnings-surprise interaction effects, Best and Best found that good news announcements (where both surprises were positive) furnished significant positive slope coefficients when current-year and next-year forecast revisions were used as the dependent

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[67] Lipson, Maquieira and Megginson (1998), p. 43, Table 4. This finding in Panel A was confirmed by a test involving direct comparison of match pairs in Panel B of the table, where in two out of three measures of earnings surprise, the distinction was maintained with at most a 5 percent level of error.
[68] Best and Best (2000), p. 237. Dividend and earnings surprises were computed according to Aharony and Swary's (1980) naïve expectations model.
[69] Ibid, p.243. The authors note that the failure of the principal dividend surprise variables (both positive and negative) to furnish significant slope coefficients in all but one instance in Table Three (p. 242) indicates "that dividend surprise does not drive earnings revisions as implied by earlier studies."

variable, as did positive earnings surprises linked with no change in dividend.[70] Interestingly, bad news announcements (where both surprises were negative) furnished a significantly negative slope coefficient with respect to revisions of next-year forecasts, which suggests that, in this instance, analysts tended to revise their forecasts less strongly downward than expected.[71] More strongly and in the same vein, the interaction of no change in dividend and a negative earnings surprise produced a significantly negative coefficient with respect to both current-year and next-year forecast revisions. When Best and Best used revisions of long-term forecasts (defined as covering the next five years) as their dependent variable, the only interaction variable to furnish a significant relation was the interaction of positive earnings and no change in dividend. The principal variable, negative earnings surprise also produced a significant positive slope coefficient.

In New Zealand, Raj and Thurston (1995), who did not deal with announcement-based dividend signalling directly, ran regressions on three-months-lagged dividend yield and earnings yield data to determine if these had any ability to predict future earnings. Using data from 1980 to 1993 they were unable to disprove the predictive powers of the two forms of lagged yield.

A subsequent New Zealand paper, Vos and Tong (2001), which did focus on the relationship between dividend announcement and subsequent levels of earnings, also found no significant connection between dividend increases and the behaviour of earnings in the following two years; but a subsample of firms announcing dividend decreases furnished a statistically significant rise in earnings in the first year. This subsample, however, contained only 26 observations; and the entire data set, 138 firm-year observations from firms listed on the New Zealand Stock Exchange in the 1990s.[72] Having determined, in accordance with Benartzi, Michaely and Thaler (1997) that New Zealand dividends contain no message concerning future earnings increases, they tested for evidence of a signal of future earnings stability onward from the dividend announcement. Again, Vos and Tong found no significant difference in future earnings performance between dividend-increasing firms and unchanged-dividend firms.

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[70] Ibid, Table Three, p. 242.

[71] Ibid, p. 236. Unexpected forecast revision (UE_i), which is used as the dependent variable in the regressions reported in Table Three, is defined as the difference between actual forecast revision and expected forecast revision.

[72] Vos and Tong (2001), p. 175. The study used dividend and earnings data for companies listed on the New Zealand Stock Exchange with dividend payouts in two consecutive years (t_0 and t_{-1}) and five years of net profit (t_{-2} to t_{+2}).In all there were only 51 firms. All dividend data is stated as having come from within a 1992-1996 time span. (But, given that two years of earnings data was required, this was possibly 1995?). The authors state that the earliest earnings data came from 1991 and the latest came from 1997, while the earliest dividend data came from 1992. The 1992-1996 data was collected from Datex Ltd while earnings data for 1991 and 1997 were collected directly from company annual reports.

Vos and Tong also observed the relationship between the previous year's (year t_{-1}) and current year's (year t_0) earnings changes and the dividend announcement. While earnings changes in the current year were significantly correlated with positive dividend changes at the ten percent level of error, no such relationship extended back as far as year t_{-1}. In other words, the only coherent message Vos and Tong found in New Zealand dividend announcements was a reinforcement of earnings information published for the same accounting period. Indeed this relationship was found to be stronger for final dividends than for interim (half-year) dividends; and the authors argued that this indicated that earnings led dividends and that there was greater certainty as to what end-of-year earnings were after they were established at the year-end.[73]

In the manner of Healy and Palepu (1988), Ho and Wu (2001) studied the relationship between dividend initiations (and omissions) and future and past earnings by a sample of listed U.S. companies (1964 – 1995). What made Ho and Wu interesting was that they included an explicit examination of the impact of survivorship bias. This bias arises whenever samples are selected on the basis that companies do not become defunct within the study's post-event horizon (usually a generous number of years). They argued that the bias could be mitigated by reducing the time-span obligatorily surrounding each dividend announcement.

Ho and Wu found that initiations, while being associated with earnings increases over the previous four years, had no statistically significant connection with the nature of future earnings; where Healy and Palepu had found a falling off of earnings. Ho and Wu's omissions were associated with two years of statistically significant future positive earnings growth, which was one year less than that found by Healy and Palepu, and was attributed to the inclusion of firms that subsequently were delisted. Survivorship bias, they argued, contributed to overstating the duration and significance of any relationship between announcements of either sort and post-announcement earnings changes.

Mozes and Rapaccioli (1998), noting that the experimental designs used by DeAngelo, DeAngelo and Skinner (1992), Leftwich and Zmijewski (1994), Brown, Choi and Kim (1994) and Carroll (1995) all relied on the assumption that the size of an increase in dividend paid out was related to the size of the increase in future earnings expected by firms' managements, set out to scrutinize this relation, and found it to be faulty. While modest increases in dividend tended to

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[73] Ibid, p. 178. Vos and Tong argued in particular that dividend announcements followed earnings announcements: "These findings confirm that earnings lead dividends, not vice versa. That is to say that the final dividend announcements follow the earnings announcements and are more highly correlated to the final announcements than to the interim announcements." This is an interesting statement given that in New Zealand, the announcement of both earnings and dividends is normally made simultaneously in the one disclosure to the New Zealand Stock Exchange, which is then published onwards.

precede a rise in company net earnings, the researchers furnished evidence that large dividend increases tended, actually, to be harbingers of long-term net earnings reductions starting the year after the announcement. This finding also threw into doubt the validity of a related assumption — that earnings decreases are signalled only by a preceding reduction in dividends (or dividend omission).

Mozes and Rapaccioli used a chi-square test to show, with a one percent level of error, that firms with large dividend increases did indeed have different future earnings profiles from those of firms with only modest dividend increases. The authors then reconfirmed the existence of this difference with a logistic regression in which a reduction in current earnings (the dependent variable) was associated with dummy variables representing a reduction in last year's earnings, an increase in last year's dividend, and a continuous variable measuring the size of last year's dividend increase.[74] Mozes and Rapaccioli's data set contained dividend and earnings information covering 681 firms from the CRSP and IBES data bases in the period 1980 – 1990.[75] Their definition of a large dividend increase was one that was greater than their sample's mean dividend.

Mozes and Rapaccioli (1998) also found that firms suffering a decrease in earnings in the year of the observed dividend announcement could be distinguished in terms of their future earnings performance by whether or not they reduced their dividend. A dividend reduction tended to presage ongoing future losses, while firms which held dividends constant did not necessarily suffer future decreased earnings.[76] This finding fitted with firms having perhaps gambled successfully in terms of Ghosh's (1993) theory of regret and only having reduced dividends when they know there was no hope of rescue from a fate of long-term lowered earnings.

Further, Mozes and Rapaccioli showed that, while a large dividend decrease was a signal forecasting future earnings reductions, there was no such earnings signal apparent in small-scale dividend reductions. The authors also showed, that financial market analysts revised their earnings forecasts upon receipt of dividend announcements in accordance with the size of the dividend increase or reduction. This was in keeping with, and a refinement of Carroll's (1995) finding that analysts' forecasts became less dispersed upon receipt of a dividend announcement.

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[74] Mozes and Rapaccioli (1998), pp. 34 – 35. The intercept term in this logistic regression represented the dummy variable 'increase in last year's earnings'. The coefficient for this was also significant at the one percent level of error.
[75] Ibid, p. 37, Endnote 1: The IBES data base is one which has been constructed by a group of US academics for the furtherance of their own research, as implied by the acknowledgment, "In addition, the authors thank Lynch, Jones and Ryan for providing access to their IBES data base."
[76] Ibid, p. 35. This difference was significant at the 3 percent level.

2.2.5.4 Categorizing the Announcement Signal by Subsequent Earnings Data

Where most studies scanned forwards from the announcement date to determine the existence or nature of signalling, Brook, Charlton and Hendershott (1998) categorized subsequent cash flow information to throw light on the nature of a dividend announcement variable retrospectively. In other words, where other studies had used the size of horse as a device for checking the cart it might pull (and then judging the horse), Henderschott et al categorized a data set of carts and observed what types of horse might be found pulling them. An initial focal point in this study was the size of dividend announced (following at least four years of prior steady cash flow)[77] given either a permanent increase (PI) in subsequent cash flows, a temporary increase (TI), or no increase in cash flows (NI) as measured over the subsequent four years.[78] A significant correlation between the status of subsequent cash flow and the size of dividend initiated could be ascribed to a premeditated act of signalling on the part of company managers. An insignificant correlation would point to the absence of premeditation.

The median dividend increase of PI firms at 9.1 percent in Brook et al's study turned out to be significantly larger than the 5.6 percent for NI firms and 4.5 percent for TI firms.[79] Further, the PI companies continued to increase their dividends at the end of years 1, 2 and 3. But the most salient point in the authors' eyes was that the initial announcement of an increased dividend at the end of year zero preceded the onset of permanently increased cash flows. Firms in this category were rewarded for the dividend increase by generating abnormal returns that were 29.3 percent above those of the market in general in year 1, which was sustained at 15.3 percent and 8.1 percent in years 2 and 3. Brook et al interpreted this as clear evidence of dividend signalling that was consistent with Benartzi, Michaely and Thaler (1997). It was interesting, however, that this same company grouping also provided ARs over year zero of 17.5 percent[80] all of these figures were significant at the one percent level of error with the exception of the third year return, which was still significant at the 5 percent level of a Type 1 error.

The TI firms exhibited quite a different pattern. Unlike the PI firms, these had earned statistically insignificant abnormal returns in year zero; but had generated strongly significant abnormal

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[77] Brook, Charlton and Hendershott (1998), p. 48. Steady cash flow is defined as cash flow which does not vary outside 30 percent of the company's average over the four years, i.e., $year_{-3}$ to $year_0$

[78] Ibid, pp. 47 – 48. A permanent increase (PI) in cash flows was defined as at least a 30 percent increase for each of the subsequent four years. A temporary increase (TI) was defined as at least a 40 percent increase in the first year followed by a lapse back to less than 20 percent increase in either the second or third year. A no-change company (NI) was defined as one with cash flows which increased less than 30 percent over the next four years, and which varied by less than 15 percent from year to year. The sample contained 101 PI firms, 45 TI and 34 NI firms.

[79] Ibid, p. 49.

[80] Ibid, p. 53, Table 4: Annual Abnormal Stock Returns.

return of 22.2 percent for shareholders over year 1 in the aftermath of announcing a dividend increase. In years 2 and 3, however, the TI firms faltered; and their abnormal returns became negative (but still weakly significant). This was in spite of it being retrospectively apparent that these firms had engaged in dividend-smoothing.

With respect to the NI firms, no statistically significant abnormal returns were found in any of the years mapped even though there were small increases in the announced dividend in years 0, 1 and 2 of a diminishing nature, which petered out in year 3. Actually, only in year 1 was there a statistically significant difference between the dividends (and also abnormal returns) of TI firms and NI firms.

In sum, Brook et al found that investors heed signals in dividend announcements generally, and do act on them (although it was unlikely they would have been able to distinguish between PI and TI firms in year 1); and managers, aware of permanent increases in future cash flow, proactively signal this information in advance.

2.2.5.5 Future Earnings Volatility

Further work on post-announcement volatility was performed by Carroll (1995). He reconfirmed Sant and Cowan (1994) and Venkatesh (1989) in finding that dividend increases mapped onto an increase in future earnings and a decrease in future earnings volatility. With respect to dividend-decrease announcements, Carroll recorded a decrease in future earnings and an increase in future earnings volatility.

In the same paper, Carroll also assessed the accuracy of earnings forecasts issued by the firm, Value Line, before and after a dividend announcement event. The pattern of the results was congruent with those of the first leg. Value Line's post-announcement-event forecasts for firms announcing dividend increases exhibited a smaller cross-sectional dispersion than its corresponding forecasts for the same firms made prior to the announcement event. Conversely there was an increase in the cross-sectional dispersion of earnings forecasts associated with the set of firms announcing dividend decreases.[81]

According to Dyl and Weigand (1998), the information conveyed to the market by the initiation of dividends was a reduction in the risk of the firm. They reconfirmed that dividend initiations were associated with a significant reduction in the volatility of firms' earnings from pre-announcement levels. This drop was found to be valid on data derived from twenty-four quarterly earnings reports collected from before and after the announcement date — twelve each

[81] Carroll (1995), pp. 294 – 295.

side. In other words, the variance of earnings over the ensuing three years was shown to be lower than that of the three years leading up to the announcement.[82]

I will now turn to research concerning joint dividend-and-earnings announcements.

2.2.6 The Problem of Confounding Events

2.2.6.1 Section Introduction

The problem of dividend announcement and earnings announcement effects confounding each other was known and discussed for quite some time before it was properly addressed. Charest (1978), for instance, noted that it prevented him from being able to assign the excess return of about one percent isolated in his study to the existence of a dividend signal. Aharony and Swary (1980) emphatically avoided it by choosing announcement observations where the disclosure of a dividend was separated from that of the period's earnings by at least one and up to more than 60 trading days. Asquith and Mullins (1983) similarly required a separation of at least ten days. In Subsection 2.2.6.2, the substitutability of the two announcement types is explored; and Subsection 2.2.6.3 looks at research concerning joint dividend and earnings announcements.

2.2.6.2 Examinations of Proximate Dividend Announcements and Earnings Announcements

In the same year that Asquith and Mullins published their paper, Penman (1983) noticed that dividend-related returns were still significant, but smaller, if the dividend announcement followed behind an earnings forecast. Conversely, when a dividend announcement preceded an earnings forecast, the earnings forecast-related excess returns were similarly depressed.[83] Penman used a sample of US firms 1968 – 1973, all of which had a history of dividend payouts, and all of which were increasing their dividend. Healy and Palepu (1988) similarly found that a preceding dividend initiation reduced the magnitude of share price reactions generated by an earnings announcement in the following year. This also held true when the preceding dividend announcement was of a dividend omission. In this instance the dampening effect was found to be statistically significant over the ensuing five years.[84]

Venkatesh (1989) formally set out to determine whether dividend announcements and earnings announcements were complements or substitutes with respect to the information content of their signal. If they were substitutes, then earnings announcements following a company's decision to

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[82] Dyl and Weigland (1998), p.34.
[83] Penman (1983), op. cit. 42, p. 1195.
[84] Healy and Palepu (1988) op. cit. 39, p. 171.

initiate dividend pay-outs should signal less information than hitherto, which, in turn, would be discernible in terms of a lower level of event period returns.[85] This was tested out on 1972 – 1983 NYSE and AMEX data obtained from CRSP, COMPUSTAT and the Wall Street Journal Index.

Venkatesh found a magnitude reduction that appeared to last over the long term. Returns associated with earnings announcements measured over 15 quarters were lower after a company initiated dividends. This result occurred irrespective of whether the dividend announcement preceded or followed the earnings announcement.[86] Venkatesh also recorded a drop in the volatility of raw returns following the initiation of dividends, which the researcher ascribed to a downgrading by investors of the importance of other forms of company announcement and also the paying of less attention to rumour. Investors, instead, switched their search for useful portents to the dividend announcement.[87]

Eddy and Seifert (1992) proposed that if earnings announcements and dividend announcements were indeed perfect substitutes, then a joint earnings and dividend announcement should not elicit a stronger reaction from investors than a single announcement of either dividends or earnings. Put to the test, joint announcements containing two items of 'good-news' produced significantly higher five-day cumulative standardized returns than did non-joint announcements.[88] Earnings and dividend announcements were therefore not perfect substitutes. Eddy and Seifert also found that joint announcements containing opposed information (falling earnings with rising dividend or vice versa) should produce an average price reaction of zero. Their 1983 – 1985 data set on 1,111 firms was obtained from CRSP and COMPUSTAT files, and the Wall Street Journal Index.

Brown, Choi and Kim (1994) investigated the impact of the time lapse between the end of the firm's accounting period (in quarters) and the announcement of the period's earnings and dividends. They found that the information content of earnings announcements decreased as the lapse, measured in days, became longer. However, this relation was reversed with respect to dividend announcements and announcement time-lapse. Brown et al found that the information

[85] Venkatesh (1989), p. 182.
[86] Ibid, pp. 186 – 187, See Panel A of Table 2: Before dividends were initiated, the average market adjusted return was 5.2 percent. Once dividends had been initiated, this dropped to a 14-quarter average of 3.83 percent when the earnings announcement preceded the dividend announcement, and 4.73 percent when the quarterly dividend announcement came first.
[87] Ibid, p. 176.
[88] Eddy and Seifert (1992), p. 211. See Table 1. This was confirmed by regression analysis incorporating a dummy for announcement type (joint or non-joint) and which also factored in the influence of the relative size of each of the joint announcement's components. See p. 213.

content of dividend announcements was most clearly evident in a subsample of large firms. Since they had theorized that the directions of impact of earnings announcements and dividend announcements would conflict, the researchers chose to use non-contemporaneous announcements to avoid the cancelling effect. Effectively Brown et al were looking at the impact of time lapse on paired, but separate announcements following the close of an accounting period.

Carroll (1995), who was mentioned with respect to the volatility of future earnings in the previous section, also investigated the association between earnings forecast errors and post-dividend-announcement earnings announcement returns. In this instance Carroll again was able to conclude that announced increases in dividends reveal an increase in the level of expected future earnings; but the connection between the announcement and future levels of earnings variance was not significant.[89]

Elfakhani (1998) set out to critically evaluate the role of dividend announcements where the announcement was made between 5 and 45 days after the earnings announcement.[90] He identified three components within the dividend signal with respect to mitigating uncertainty — expected favorableness, direction and role — and ranked them in relative importance. The favorableness component simply entailed the announcement's containing good news or bad news for the future in a quantitatively vague manner. Direction was a matter of dividend increase or decrease; and the role of a dividend announcement was to confirm, clarify or be ambiguous about the preceding earnings announcement. Of these components, Elfakhani found that favorableness was the most important. While this would imply that substitution between dividends and earnings announcements must therefore play a secondary role at best, Elfakhani was silent on this aspect.

Mozes and Rapaccioli (1995), extending the work of Atiase (1985) on size with respect to the related field of the information content of company earnings announcements, concentrated on the interrelationship between dividend announcements, earnings announcements and firm size. They hypothesized that dividend announcements and firm size were independent of each other, and found this was clearly not so. In the first instance, the raw characteristics of the firms in their random sample of 500 firms from COMPUSTAT in 1980 – 1985 belied the assertion.[91] The

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[89] Ibid, p.295

[90] Elfakhani (1998), pp. 224 – 225. Elfakhani used CRSP Master Daily Files and quarterly COMPSTAT tapes for 40 quarters from 1 January 1976 to 31 December 1985.

[91] Mozes and Rapaccioli (1995). The researchers generated a random sample of 500 firms from 1980 – 1985 COMPUSTAT data also available on CRSP tapes, which were categorized as large or small depending on whether their year-end market equity value was above or below the median for all firms on the COMPUSTAT tapes.

dividend-announcing firms had a mean size over twice that of the non-dividend-paying firms, and boasted a median size just over four times the median of the non-payers.[92]

Mozes and Rapaccioli then examined the inter-relationship of earnings announcements, dividend announcements and company size with respect to the information content of separate dividend and earnings announcements in a more sophisticated manner with a series of regressions. Since the researchers' sample included firms which paid no dividends at all during the sampling period (or alternatively announced dividends after making earnings announcements), the presence or absence of a preceding dividend announcement could be seen as modifying the information content of the subsequent earnings announcement.

Mozes and Rapaccioli's measure of information content in an announcement was a standard index (SI) generated from the abnormal returns associated with the earnings announcement event period deflated by abnormal returns from a matched average prior period.[93] If this index was greater than unity, then the earnings announcement was deemed to contain information not available at other times. The basic relationship between earnings announcements and size was established by running a simple regression in which the SI was the dependent variable, and the natural log of market equity was employed as the independent variable, SIZE. That SI was not independent of SIZE was validated at the one percent level of error.

The argument that firm size and dividend announcements were significantly related to each other was then tested by showing, in a multiple regression on the dependent variable SI, that the presence of a dummy variable representing the presence of a prior dividend announcement would produce a slope coefficient of the independent variable SIZEDE (size of a dividend-paying company only) that would be insignificantly different from zero. This was found to be the case. In other words, the earnings announcement abnormal returns construct, SI, ceased to have a significant association with company size; but the dividend proxy variable, on the other hand, was significant.

By contrast, in the same regression, if a variable representing the size of non-dividend-paying companies only, SIZND took on a positive value, the result of the initial simple regression would be confirmed via the presence of a significantly negative SIZND slope coefficient. (In this

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[92] Ibid, Table 1, p. 79: The 128 dividend payers had a mean size of $US 872 million and a median size, $US 284 million. The 84 non-dividend-paying firms had a mean of $US 330 million and a median of $US 69 million.

[93] Ibid, The researchers' method for constructing the standardized index (SI) entailed using the market model to generate 'unexpected returns' (or abnormal returns, the residuals of the model's simple regression) for the 5-day period on and about the earnings announcement, which they squared and then divided by the square of the residual generated over an prior announcement-free 5-day period. The prior 5-day period figure was an average of the 5-day residuals over the preceding 25 weeks.

instance, SIZEDE and the dividend dummy would take on zero values.) Indeed, a significantly negative SIZND slope coefficient was generated. In other words, as company size increased, there was a decrease in the information content of the earnings announcement (in the absence of a prior dividend announcement). The researchers then strengthened these findings when they dropped the variable SIZEDE from the procedure. The intercept, the dividend dummy and SIZND all furnished slope coefficients significant at the 1 percent level.

Mozes and Rapaccioli concluded from the above that a dividend announcement preceding an earnings announcement effectively robs the latter of all size-related information. From this, it follows that, whatever the size of the firm, such a dividend announcement contains all information conveyed by sources that are available exclusively to investors in large firms. They noted:[94]

> *One implication of our results is that after the firm's dividend announcement, investors in small firms do not have any informational disadvantage relative to investors in large firms. ...[P]rice-based earnings forecasts will be equally accurate for small and large firms.*

2.2.6.3 Examinations of Joint Earnings and Dividend Announcements

Joint announcements are actually the norm in Australia, New Zealand and in the United Kingdom. Given this fact alone, it was inevitable that considerable research effort would be put into the sorting out of the component effects bound together in simultaneous announcement events.

The seminal paper of this sort, however, was on U.S. data. This was Kane, Lee and Marcus (1984). Given that U.S. firms do not generally make joint earnings and dividend announcements, they chose observations where the announcements were either simultaneous or separated by less than ten days in time, thereby providing a neat methodological counterpoint to that of Asquith and Mullins (1983). Kane et al controlled for the confounding effects of simultaneity (or contemporaneousness) by using dummies in their regression models representing the various permutations of possible movement-combinations of announced dividends and announced earnings. In particular they regressed the independent variables *unanticipated dividends* and *unexpected earnings* along with the dummies against the dependent variable, *cumulative abnormal returns.*

Kane, Lee and Marcus found that all but one of their dummies were significant at the one percent level of error according to their *t*-statistics; whereas the unexpected dividend and earnings

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[94] Ibid, pp. 85 – 86.

change variables were not significant even at the five percent level. They interpreted this as evidence that investors do indeed take both sets of information into account rather than one of them alone. However, it is to be noted that their CRSP and COMPUSTAT-derived US data set contained only 352 observations, 96 of which had been selected precisely because there had been a dividend change of 5 cents or more per share. Nevertheless, Kane, Lee and Marcus's finding was corroborated by Eddy and Seifert (1992), who compared contemporaneous and non-contemporaneous dividend and earnings announcements in the U.S.

In New Zealand, where dividends and earnings are normally announced together, Emanuel (1984) made a foray independently onto the same ground in the same year. Emanuel examined the effect of 1196 joint earnings and dividend announcements on returns (generated by the market model)[95] using weekly share price data from the University of Auckland Share Price File. The announcements were made by 153 firms, covering all major industries, listed on the New Zealand Stock Exchange between 1967 and 1979. Emanuel found that the abnormal returns (AR) generated in the announcement week ($week_0$) by jointly dividend and earnings-increasing (DI-EI) firms were positive and validated by a *t*-test significant at the five percent level of error; and that the equivalent dividend and earnings-decreasing (DD-ED) results were negative and significant at the five percent level. Interestingly, he also found that when earnings were increased while the dividend was left unchanged (DNC-EI), the result was positive and significant. Conversely, the result associated with an unchanged dividend and a drop in earnings (DNC-ED) was negative and significant. This implied that the impact of earnings tended to be greater than that of dividends.

Emanuel also plotted weekly cumulative average residuals (CAR) for six earnings-based portfolios over a period starting 50 weeks before $week_0$ and ending 30 weeks after the announcement week.[96] The two extreme cases of CAR drift were provided by the DI-EI firms, whose CARs rose sharply about week zero then climbed gradually, and the DD-ED firms whose CARs dropped sharply about week zero then oscillated a little before drifting downward. The remaining categories of joint announcement plotted intermediate courses, the DNC-EI company CARs rising at week zero from a negative value to a positive one, but afterwards oscillating closely around zero, while the DNC-ED and DI-ED company CARs consistently drifted

[95] Emanuel (1984), p27. Emanuel generated his ARs and CARs over 104 weeks of data straddling the joint announcement date once a block starting 52 weeks prior to the announcement and ending 26 weeks later had been taken out.

[96] Ibid, pp 34 – 35, Figures 1 and 2.

downward from week$_{-50}$. Of note was the fact that the DI-ED firms' CARs were more negative than those for DNC-ED announcing firms.

However, since he did not perform any analysis on his ARs and CARs beyond *Z*- and *t*-tests, Emanuel did not calculate the interaction effects between the two announcement components. In fact he did not look into the role of dividends in the joint announcement other than to say[97]:

> *It is possible to argue that profits and dividends are proxies for more fundamental determinants of share prices, or that dividends have a capability to convey relevant information as managers are restricted with regard to statements they can make about the future earning capacity of the firm, and because earnings variability is likely to be greater than dividend variability.*

In the Australian context, where earnings and dividend announcements are also almost always simultaneous, Easton and Sinclair (1989) recorded the existence of statistically significant ARs to equity associated with the earnings component of the announcement. This finding was made where earnings were defined as unexpected earnings; but this finding remained robust when alternative definitions of earnings were tested. However, the effect on abnormal returns associated with the unexpected dividends component was much weaker, and dependent on the definition of earnings employed in the analysis.

Easton and Sinclair derived these results from two sets of announcement portfolios. First they created five portfolios in which half-yearly unexpected dividends were systematically graded by size (and unexpected earnings by size left random); and second, they created five portfolios from the same dataset in which the unexpected earnings were graded by size (and dividends left random). Easton and Sinclair also noted that the unexpected earnings relating to the first half-year have a more pronounced effect on cumulative abnormal returns than do the second half-year unexpected earnings.

Easton (1991) adopted a system of dummy variables in the manner of Kane, Lee and Marcus on Australian data and found that there was an important relationship between earning and dividend contents of simultaneous announcements. Easton's study used monthly abnormal returns calculated by the market model from a 60-month pre-announcement period. After cleaning his data to avoid any confounding influence brought about by share splits, bonus issues, rights issues and takeover bids within the final month to announcement day, he had a sample comprising 896 half-yearly joint dividend and earnings announcements produced by a total of 339 companies

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[97] Ibid, p. 42.

registered on the Melbourne Stock Exchange. The announcements occurred in the period covering the second half of 1978 through to the second half of 1980.

Easton's various measures of 'unexpected change in earnings' and 'unexpected change in dividends', which had strongly significant impacts on ARs when tested in a constrained regression, became jointly insignificant when tested in an unconstrained equation containing five dummy variables modeling the six major categories of joint announcement. This indicated that the separate earnings and dividend variables in the constrained regression produced upwardly biased results in the absence of interaction variables. He suggested that "studies of earnings and dividends would be improved if interaction effects were factored into the experimental design"[98]

In the United States, Leftwich and Zmijewski (1994) examined the information content of simultaneous quarterly earnings and dividend announcements and found that the earnings component uniformly provided more information than did the dividend component, which was largely uninformative. However, when the earnings component entailed an increase in tandem with a dividend component entailing a decrease, the marginal information content of dividends became statistically significant. Leftwich and Zmijewski determined the unexpected component of earnings and dividend changes by a relatively complex method incorporating Value Line projections.

In Britain, Abeyratna (1994) and Lonie, Abeyratna, Power and Sinclair (1996) showed that combinations of dividend changes (increases/decreases) and earnings announcements (increases/decreases) had a significant impact on firms' share prices. Their results gave a clearer confirmation of the existence of signalling than any prior study was able to provide with respect to the phenomenon in the United States. Lonie et al divided their sample of UK listed companies into six categories according to whether their simultaneous earnings and dividends announcements entailed rises, falls or no change with respect to the size of earnings and to the size of dividend payout. Firms disclosing both dividend and earnings increases (DI-EI firms) produced statistically significant positive abnormal returns for each of three days: the announcement day and the day each side of it. On the other hand, firms which published decreases in both dividends and earnings (DD-ED firms) earned statistically significant negative abnormal returns on the day each side of the announcement day, but not on the day itself. Where the direction of earnings was counter to that of dividends, the size of abnormal returns (positive or negative) was less pronounced, and was statistically insignificant.

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[98] Easton (1991), p. 264.

Then Lonie et al, using dummy variables in the manner of Kane, Lee and Marcus (1984), confirmed that the interaction effect between the dividend and earnings variables locked together in the joint announcements was indeed also significant. This was strongly in line with Easton's (1991) Australian findings. They concluded that the magnitude as well as the sign of the earnings variable was important with respect to the power of the dividend variable as an information signaller. However, dividends remained inferior to current earnings as a signal in the eyes of market participants. Lonie et al also noted that companies announcing reduced earnings had a bias which entailed increasing the nominal dividend payout, and that almost 90 percent of dividend-reducing firms had concomitant earnings reductions.[99]

I now move on from the record of dividend signalling research to consider the econometric fly in the ointment with respect to consideration of joint dividend-and earnings research in the context of New Zealand's thinly traded market. This insect (econometrically speaking) is the bias-inducing effect of thin trading.

2.3 The Thin Trading Issue

2.3.1 Section Introduction

One of the factors predisposing distributions of daily returns on firms on the NZX towards non-normality is that it is a relatively thinly-traded market, and the presence of the runs of zero-returns associated with absence of trading biases the OLS beta coefficient downward. Frequent absence of trades over stretches of time inside the Market Model estimation period is strongly likely to give rise to daily returns distributions that are not normal. Furthermore, procedures introduced to compensate for missing datapoints introduce autocorrelation into the groomed data series. When that happens, the time series observations are no longer independent of each other. This, in turn, makes a nonsense of any test that is dependent on the absence of any serial correlation in order to justify a null hypothesis. In other words, hypothesis testing performed in the presence of the data-grooming procedure will mechanically produce a spurious abnormal reaction to an announcement event where none may actually have existed.

The importance of this current section is that it provides a background to the research and discussion in Chapters 6 and 7. A thin-trading effect is detected and corrected in the material concerning state models in Chapter 7 and the material concerning friction modelling in Chapter 6 explicitly turns the thin-trading effect into an advantage in an event study context. This section contains a review of the literature on thin trading in Subsection 0 in which it becomes clear that

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[99] Lonie, Abeyratna, Power and Sinclair (1996), p. 39.

attempts to correct for the effects of thin trading have not been deemed, by the subsequent research record, to have offered any real improvement upon employment of unadjusted OLS regression. The research record, does, however, make it quite clear that New Zealand is not alone in having a thinly traded market. Then, in Subsection 2.3.3, I consider the record of specific daily proxies which either are used, or could be used to plug gaps in data series caused by an absence of trading, on a trading day, of a given company's shares. Then Subsection 2.3.4 concludes this thin trading review with a short comment on the current heterogeneity in databases, globally, of the treatment of company return proxies for non-traded trading days.

2.3.2 Thin Trading Papers

There are actually two versions of trading thinness, which are closely related to each other. The first is where trades do occur within a measured period unit — say a month — but fail to occur at the end of it and therefore furnish a dubious measure of 'closing price' for the period. This is often called nonsynchronous trading. The second is where no trades at all occur within the period unit.

The impact of thin trading on regression outputs was first identified by Fisher (1966), and is indeed, called by some researchers, the "Fisher effect". Fisher observed that closing prices supposedly representing the market value of a security at the end of a measured period did not necessarily occur only from end-of-period trades, but could have been furnished by trades occurring significantly earlier, thereby introducing a time-dependent confounding factor into any index of closing prices compiled from them. This confounding influence came in the form of positive serial correlation in returns estimated from that index, which, in turn produced a misleadingly low variance of returns. Furthermore, for returns on the more thinly-traded shares in the index, beta estimates would be biased in a downward direction while those of strongly-traded shares would be biased upward. The underlying problem was that thinly-traded shares, when sold, realised an ostensible return for the trading period which was not only the return on the period, but one cumulating all price change in one lump since they were last traded; and that could have been within or even before the period.

Scholes and Williams (1977) investigated the first version of trading thinness — nonsynchronous trading. They theorised, in the case of thinly traded stock, that OLS estimates of α would be exaggerated relative to the true value of α and that the OLS estimate of β would be understated relative to its true value. Initially the authors provided a proof demonstrating that this should be so. Then they showed that the proof was indeed corroborated empirically on a sample containing all stocks listed on the NYSE and ASE between January 1963 and December 1975.

Several aspects of Scholes and Williams' study are of particular interest. The first is that at the time of writing, daily opening and closing share price data had just become available to researchers eager to validate the CAPM (or the reverse) and the Market Model. To these researchers who were operating with data from the world's biggest and most active economy, 'thin trading' was defined as discontinuous trading within a day that entailed the closing trade for the day being some unknown time before the actual close of trade for the stock exchange for the day. This is not quite the same concept as the non-occurrence of any trade in a particular stock on a particular day. Nevertheless, the difference is surely simply one of scale. On a monthly basis, a day of zero trades in a stock would equate with just under an hour of no trades buried inside Scholes and Williams' daily data.

It is important to stress that Scholes and Williams were positing and testing for systematic bias caused by an unobserved time-lapse between the final trade and the close of the day — or to be more precise, the imprecisely measurable (at that time) interval between the final trade on day t_{-1} and the final trade the next day, day t which also would occur at some point before the close of all trading. However, the authors dealt with trading days during which a particular stock registered zero trades by deleting both this and the ensuing day on which there was a trade from the data set.

Scholes and Williams method for achieving an unbiased estimator of beta was as follows. Let b_i^+, b_i and b_i^- be the beta estimates obtained from three separate regressions of the i^{th} security's return at time t, where the independent variable is, in turn, a one-period leading, concurrent, or one-period lagging return on the market index R_M. Further, let ρ_M^S be the sampling estimator[100]:

$$\rho_M^S = \frac{\operatorname{cov}\left(R_{Mt}^S, R_{Mt+1}^S\right)}{std\left(R_{Mt}^S\right) std\left(R_{Mt+1}^S\right)} \tag{2.1}$$

The unbiased estimator of beta makes use of this serial-correlation coefficient rebranded as $\hat{\rho}_M$:[101]

$$\hat{\beta}_i \equiv \frac{b_i^- + b_i + b_i^+}{1 + 2\hat{\rho}_M} \tag{2.2}$$

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[100] Scholes and Williams (1977) p. 315, Equation 15.
[101] Ibid, p 317, Equation 20.

The unbiased estimator of alpha was:

$$\hat{\alpha}_i = \frac{1}{T-2}\left(\sum_{t=1}^{T-2} R_{it} - \hat{\beta}_i \sum_{t=1}^{T-2} R_{Mt}\right) \tag{2.3}$$

When applied to their empirical data, the adjustment furnished results in which the generated α and β values were in line with those expected in theory.

The second well-cited paper in the early literature was Dimson (1979). Noting that the Scholes-Williams method required that the timing of trades be exactly known within the day and discarded price observations immediately following or preceding non-trading days, Dimson produced an alternative thin-trading adjustment. This adjustment, he argued, took better account of the incidence of non-trading periods — version two of trading thinness.

Dimson's method entailed the compilation of an aggregated coefficient, which was the sum of the betas obtained from a multiple regression employing the matching market return as one independent variable, along with one or more lagged market returns and one or more leading returns.[102] In its simplest form (a matching and single lagged and single leading term only) for stock *j*, the method can be expressed:

$$\begin{aligned} R_{ji} &= \alpha + \beta_{-1} R_{M,t-1} + \beta_0 R_{M,t} + \beta_{+1} R_{M,t+1} + \varepsilon_{j,t} \\ \hat{\beta}_j &= b_{-1} + b_0 + b_{+1} \end{aligned} \tag{2.4}$$

Where, for t = -1. 0, +1, each *b* is the calculated estimate of β.

However, twelve years later, Fowler, Rorke and Jog (1989) were to write of Scholes and Williams (1977)[103] and Dimson (1979):

> *While the Scholes and Williams ... technique has been proven to be better than the [Dimson (1979)] technique in removing bias, the variance of the estimator produced by each method is large, so that the betas are imprecise. In fact, on the basis of variance, OLS procedures (although more biased) prove to be superior to either except for cases of extreme thinness.*

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[102] Dimson (1979) p. 204.
[103] Fowler, Rorke and Jog (1989), p.24.

In the meantime, Fowler and Rorke (1983) argued that Dimson's (1979) estimator of beta was not correctly specified. They proceeded to present a corrected version that furnished results identical to Scholes and Williams (1977).

In the same year as Dimson published his paper, Fowler, Rorke and Jog (1979) investigated another aspect of thin trading — the relationship between thinness and the r^2 generated by the Market Model. Citing Morin (1976), they noted that Canadian securities' returns generated by the Market Model explained 18 – 20 percent of variation in actually observed returns, and that the model's explanatory power was even lower in the case of thinly traded stocks. In other words, the use of thinly-traded stocks was associated with lowered r^2 values.

At the time of a preliminary draft in 1978, the authors recorded that only 20 percent of the firms in the index of the top three hundred companies on the Toronto Stock Exchange (TSE 300) could be considered "fat" (ie, consistently well-traded); and in terms of all companies listed on the exchange, this dropped to only six percent. Therefore the TSE (like the NZX in the current study) was characterised preponderantly as a market of thinly traded shares.

With respect to the connection between thinness of trading and r^2, the authors found a consistent diminishing pattern. Fat traders produced the highest average r^2 and infrequent traders, the lowest.

Fowler, Rorke and Jog also set out to determine, the relationship between thinness of trading and heteroscedasticity. Three tests were employed: a rank correlation test, a modified Bartlett test, and a Goldfield and Quandt test. The authors found that the rank correlation test failed to furnish any consistent relationship between thinness of trading and heteroscedasticity; but the latter two tests showed an increasing level of heteroscedasticity from fat to infrequent traders.

Dimson and Marsh (1983) found that analyses of risk which did not take thin trading into account were likely to seriously overestimate the stability of the beta risk measures computed. First they set out to show analytically that thin trading produces a systematic bias with respect to stability. They ascribed the cause, in the first instance, to the fact that the size of the beta estimates, is biased downward, and this, in conjunction with the persistence of stretches of non-trading, yields a spurious stability. The authors noted that this spurious stability may be the reason why betas in the French and Belgian markets, at the time they were writing their paper, were deemed more stable than those on stocks listed on the NYSE.

Turning to monthly UK data from 1955 to 1979, Dimson and Marsh calculated simple regression betas based on five years of observations per regression, and found the mean of these betas was considerably less than unity. Given that this was an even-weighted mean, the preponderance of small companies with patchy trading characteristics would be expected to produce this result; whereas a value-weighted mean calculation would have been expected to produce a result not significantly different from unity that might have disguised the presence of a thin-trading effect. In addition, the authors detected the presence of a questionable stability.

However, the authors made use of the fact they knew the trading date inside each month to correct directly for the thin-trading bias and the spurious appearance of stability. Their method entailed entering uneven time intervals into their regressions — an interval being defined as the lapse in time from one actual closing trade till the final trade recorded in the following month.

The authors then went on to show that UK betas, once adjusted for thin trading, are no more stable than the betas calculated on US stocks. All regress over time back to their mean. Dimson and Marsh also noted the existence of a trade-off between the number of observations in the estimation procedure and the risk of contamination from unconsidered external factors. Given that their regression runs contained five years (and later, 25 years) of monthly observations, there was plenty of scope for changes in commodity/service trading patterns, capital structure and a host of other firm-specific attributes. One should not necessarily expect a beta to remain stable.[104]

Quite a different approach to removing thin-trading bias (denoted in their study as an "intervalling effect") was furnished by Cohen, Hawawini, Maier, Schwartz and Whitcomb (1983a). Defining a differencing interval as the size of period for which a return is recorded (ie, a day, 10 days, 20 days …), they calculated an asymptotic estimator of beta. This asymptote was the value towards which an OLS beta would converge as the differencing interval was increased without limit. The authors showed that this asymptotic beta was a consistent estimator of the true beta. Cohen et al found in an empirical analysis that their results conformed with their theoretical expectations. The mean square error associated with the inferred asymptotic betas was effectively zero.[105]

Seven months later Cohen, Hawawini, Maier, Schwartz and Whitcomb (1983b) produced an analytical model for calculating unbiased betas that was more in the tradition of Scholes and Williams (1977) and Dimson (1979). The model was a generalisation of Scholes-Williams technique, but did not require (as the Scholes-Williams one did) that a share must be traded at least once per period, every period.

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[104] Ibid, pp. 772 – 773
[105] Ibid, p.143, Table 4.

McInish and Wood (1985) proposed an alternative method for controlling for thin trading bias entailing the use of a linear programming model to construct portfolios in which the level of thin trading was held constant while other variables of interest were allowed to vary in value. The technique required three data inputs. The first was a measure of the average time between trades, which in their case was in minutes (the variable, MINTERVAL); the second was the market value of each firm in the sample; and the third component was the share price and market index data for estimating returns and betas. The authors claimed two advantages for the method. The first was that it did away with the need for beta estimates that control for thin trading bias; and the second was that it allowed for controlling the mean and higher moments of additional variables.[106]

Jain (1986) used US daily price data from the CRSP file to calculate 17,473 runs of OLS-generated Market Model regressions which were then re-run with a Scholes-Williams-adjustment. Given that each observation was generated from 300 days of estimation data, the three matched sets of parameter observations were then employed to determine which of them proved the least biased and most efficient estimator of prediction error over the ensuing 300-day estimation period. Jain found that the Scholes-Williams correction was no better than OLS in terms of the distribution of prediction errors.

Corrado (1989) constructed a nonparametric rank test that outperformed the standard parametric *t*-test under all but ideal conditions. Using daily return data from CRSP (1962 – 1986) on 600 companies, he showed that it displayed a superior power over *t*-tests employing non-standardised and standardised excess returns in the detection of positive abnormal performance on day zero of an event study. The rank test was modified by Corrado and Zivney (1992), who adjusted for the occurrence of non-trading periods. Corrado's rank test was further retested by Campbell and Wasley (1993) on NASDAQ data and found to perform robustly where OLS estimates with portfolio test statistics and standardised test statistics did not.

Fowler, Rorke and Jog (1989) developed a set of related alternative techniques for obtaining consistent estimates of beta in the presence of thin trading. They noted in their introduction a point that is pertinent to the current study, which has made use of the NZX All Companies Gross Index[107]:

[106] McInish and Wood (1985), p. 74.
[107] Fowler, Rorke and Jog (1989), p. 24.

Since all broad-based indices will include some thinly traded securities, this results in the combination of a partly thin index with a correctly observed stock price that … leads to upwardly biased beta estimates.

As in their 1979 paper, the authors developed their arguments in terms of a unit period of one month, and defined three categories of security: 'fat' if always traded on the month's closing day, 'moderate' if there is at least one trade every month, but not necessarily on the last day, and 'infrequent' if there are months in which no trades take place. A 'mixed' market index will be one in which some of the component stocks are "moderate" in nature. Further, to make their method workable, Fowler, Rorke and Jog required prior knowledge of the last day of trading (within the month) for each stock. They developed a corrected beta estimate for a moderate security (in conjunction with a moderate index) from the covariance between two moderate securities and a further beta adjustment for infrequently traded stocks. With respect to infrequent stocks, the authors considered only those with sporadic non-trading months but never consecutive non-trading months.

Fowler, Rorke and Jog's techniques, when measured against OLS, Scholes-Williams' (1977) method and Dimson's (1979) technique, produced the smallest biases for every combination of stock type and index, and also the lowest regression mean squared error (RMSE). Further Fowler et al's techniques provided the best trade-off between bias and variance. They noted that the Scholes-Williams technique worked well in a portfolio context; but for the calculation of individual stock betas, it furnished unreliable estimates.[108]

Berglund, Liljeblom and Loflund (1989) used daily Helsinki Stock Exchange data (1977 – 1985) to compare OLS beta estimates with estimates produced by three alternative methodologies. The first of these was a generalized least squares regression on trade-to-trade returns; the second was a Bayesian estimator suggested by Vasicek (1973); and the third was four versions (differing by the number of incorporated leads and lags) of Cohen, Hawawini, Mayer Schwartz and Whitcomb's (1983b) estimator. The methodology used by the authors entailed harvesting a series of betas from a first run on the data, which, grouped into three-year time-based subsamples, could be regressed against each other. The *t*-ratios and R^2 statistics reported in permutations of this second run were then interpreted as indicative of the strength of a beta (of a particular method) as a predictor of future betas (by the same or an alternative method). The primary aim was to check on the stability of alternative beta measures.

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[108] Ibid, p. 32.

The most salient aspect of the choice of the Helsinki Exchange was that many of the stocks not only traded thinly, but tended to miss entire trading days. However, this appeared to make no difference. The authors found that OLS turned out to be the over-all best performer — even in the presence of missed trading days. Indeed, while various of the other beta estimators were superior to it and to each other in specific limited instances, none were able to improve upon it consistently. This was especially interesting given that Cohen et al's estimator had been specifically designed to reduce bias in the presence of non-trading with concomitant, but lesser loss of efficiency. Further, the authors found that this estimator performed best when only one lead and lag were specified; and performed worse than any other estimator when five and ten leads/lags were specified. The improvement in unbiasedness was quite clearly swamped by its reduction in efficiency.

The authors concluded that none of the methods developed for reducing the thin-trading bias in estimated betas, or combinations of them, were likely to furnish much improvement on the simple OLS estimator; and they noted[109]:

> *... [A] great deal of care should be applied when such a combination is selected to prevent the introduction of additional complexity not matched by a corresponding increase in accuracy.*

Bartholdy and Riding (1994) turned to the thin market of New Zealand equities to run their check on Dimson's (1979) and Scholes and Williams' (1977). Interestingly, they found that OLS performed with less bias and lower variance than either the Dimson or the Scholes-Williams adjusted betas.

Bartholdy and Riding examined monthly returns on New Zealand shares that were continuously listed throughout a six-year period from the start of 1982 till the end of 1987, computed from daily price information stored in the University of Otago SDS database — Bartholdy's own university. This enabled the authors to apply and adapt Fowler, Rorke and Jog's (1979) four categories to their 110 firms. Of these, only thirteen shares fell into 'fat' category with trades on 98 percent of all trading days; and only six traded on all available days in the period. The 13 fat shares recorded an average trading lag (in days) till the end of the month of a mere 0.02 days.

A second category Bartholdy and Riding called 'moderately fat', and which contained 35 firms, traded on 88.2 percent of the available days and recorded an average trading lag of 0.23 days. Their third category, 'moderately thin', contained 42 shares that traded on almost 53.7 percent of

[109] Berglund, Liljeblom and Loflund (1989), p. 42.

market days with an average 2.44-day lag till the end of the month. The fourth category was the 'thin' category. It contained 20 shares which traded, on average, on only 20.8 percent of possible trading days and had a mean month-end 7.23-day price lag that that meant that the price was already almost one and a half trading weeks out of date.

The authors also varied their measure of market index to determine what impact this had on computed outputs. The most prominent of these were the value-weighted Barclays Index which was generated from price data from trades by the top forty listed firms. The other three were generated from Bartholdy's own university's price data resource. One was an all-companies index employing the last recorded price for each share, which incorporated the effects of thinness. The second, recognizing that the price adjustment pursuant to absence of trading would occur with the first trade after the dead patch, dropped out any company price observations that did not come from actual trading on both the date of observation and the preceding day. The third SDS index relaxed this two-day rule, requiring only that price data came from actual trades on the day under observation. The choice of market index turned out to be a significant factor in results.

All market indices in conjunction with the thin category of shares produced miniscule beta estimates on average.[110] The largest of these were consistently produced in conjunction with the SDS index compiled in accordance with the two-day rule; and the highest mean beta recorded (0.544) was obtained by a version of the Dimson technique with three-day leads and lags. This technique also provided the highest beta in association with New Zealand's leading share market indicator of the time, the value-weighted Barclay's index. It was a lowly 0.15.

However, as the authors climbed higher through the Fowler, Rorke and Jog categories of thinness and fatness, the betas climbed too, for all estimation methods and all measures of the market index. With respect to the moderately thin grouping, the SDS index with the two-day rule again uniformly provided the highest beta estimates; but the highest of these (0.756) was furnished in conjunction with the Dimson technique compiled with only two leads and lags. This pattern continued to hold with respect to the moderately fat grouping as well (although here, the Dimson three-day lag and lead technique furnished the maximum beta).

The results for the fat grouping broke the pattern. The highest betas were no longer necessarily all furnished by a particular market index; but for the Scholes-Williams technique and for Dimson with both two- and three-day leads and lags, the SDS with two-day rule maximized the

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[110] Bartholdy and Riding (1994), Table 3, p. 248.

beta for these individual methods. But the highest over-all beta for fat shares (0.904) was furnished the SDS index with stale prices impounded in it in conjunction with OLS left unadjusted.

The authors then estimated the biases relative to estimates based on synchronous data. These of grew monotonically larger in absolute size from the fat category to the thin. With respect to the fat grouping, OLS consistently produced a smaller bias than either the Scholes Williams or any of the Dimson adjustments on all market indices. This pattern maintained itself with one exception per category for both the moderately fat and moderately thin share groupings — where in both instances, the Dimson method with one day of lead and lag performed better than OLS in conjunction with one of the four market indices only. However, the pattern broke up with respect to the thin category. Here, the Dimson method with either two or days of lags and leads produced the least bias in conjunction with three market indices out of four; and OLS produced the least bias (0.007) in conjunction with the SDS index with the day rule relaxed.

Interestingly, the market index which had performed best with respect to maximizing beta, was not appreciably better or worse than other market indices over the fat, and two moderate categories in minimizing bias. In terms of the thin category, it was clearly the worst performer with recorded biases of approximately four times the size of those furnished by other indices.

Then Bartholdy and Riding looked at the means of the sum of squared deviations from their beta estimates based on synchronous data in order to judge the consistency of estimates provided by the combinations of beta estimation methods and market indices. For the fat, moderately fat and moderately thin categories, OLS provided the minimum mean value in conjunction with all choices of market index. This pattern held in conjunction with three of the four market indices for the thin grouping as well. OLS was clearly superior to the Scholes-Williams technique and to all versions of the Dimson method on this criterion.

Finally, Bartholdy and Riding reinforced the above findings by estimating a correlation matrix of beta estimators furnished by the competing methods with respect to the thin trading category only. The Pearson correlation coefficients were uniformly significant at the one percent level of a Type 1 error for all correlations. This indicates that the betas furnished by the different methods are not likely to materially differ from each other.

Cowan and Sergeant (1996) evaluated Corrado's Rank test (the 1992 version) along with a sign test specified by Cowan (1992) and a parametric test specified by Patell (1976). The testing procedure was in accordance with a methodology published by Boehmer, Musumeci and Poulsen (1991). Cowan and Sergeant found that the parametric test in the presence of thin trading turned out to be poorly specified while Corrado's rank test performed well, so long as there was no increase in return variance on the event day. If event-day variance was greater than that observed on other days, then none of the available tests performed well in a consistent manner.

2.3.3 Specific Daily Proxies for Returns on Days with no Record of Trades

A number of different approaches have been tried in the matter of proxying the value of a company return for a day (or days) in which the company's shares did not trade. One possible way of doing this was by employing a 'filling-down process' in which the closing price on the day of the last day of actual trading is repeated for every day in which trading failed to happen. The purpose of this was to procure a zero return for each of these days of zero trading. This technique was used by Abeyratna (1994) and Lonie, Abeyratna, Power and Sinclair (1996) — one of which was a paper discussed in Section 2.2.6.3 above, but neither of which explicitly addressed the issue of thin trading. This 'fill-down' technique was a way of repairing the holes in data series with a reasonable zero-value proxy. But its employment in the the context of a particularly thin market would lead to the biases already discussed in any ensuing Market Model output.

The choice of daily market-return proxy was a matter taken up by Kallunki (1997). Kallunki noted that an earnings announcement-based event study in which he had been involved, Booth, Kallunki, and Martikainen (1996) had recorded that 33 percent of their sample of Finnish shares had not actually traded at all on the day of the announcement.[111] In his current sample, drawn from all available stocks listed on the Helsinki Stock Exchange (May 1976 – December 1990), the ten most thinly-traded had a probability of not trading on any particular day that ranged from 43 to 80 percent, while the fattest stocks reduced this to between zero and three percent and the median probability was 17 percent.[112]

The three data-grooming methods the authors investigated with respect to the handling of absentee trades were:

1. The use of a bid quotation from the period as a price approximation;
2. The shrinking of the abnormal return estimation period by removal of non-trading days so that abnormal returns could be recorded on the remainder and then subsequently setting the abnormal returns for these excised days to zero (which he called the "lumped return" method);
3. The shrinking of the estimation period, as above, with one change with respect to how abnormal returns are allocated to the non-trading periods. The return calculated from

[111] Booth, Kallunki and Martikainen (1996) cited in Kallunki (1997), p. 188.
[112] Kallunki (1997), p. 189.

> prices before and after a patch of non-trading periods is allocated in equal portions across all periods in the patch. Kallunki called this the uniform return procedure.

Each of these methods entailed unwanted complications. The uniform and lumped return procedures would most definitely generate positive autocorrelation over patches of non-trading periods, while the use of bid quotations would give rise to negative autocorrelation attributable to the bid-ask bounce. Further, the lumped return method's setting of zero values for non-trading periods would increase the kurtosis of the cross-sectional distribution of returns. In checking for this, Kallunki found that lumped returns were not normally distributed at the 5 percent level of error in terms of a Shapiro-Wilk test, while uniform returns did turn out to be normally distributed. Further, the uniform return procedure would allocate periodic returns arbitrarily large or small, dependent on the magnitude of the price recorded in the first subsequent trading period, which would affect the cross-sectional means. Similarly, the assignment to a single trading period of the full impact of price change at the end of a series non-trading periods would bias the means produced by the lumped return method.

The author made use of Patell's (1976) parametric standardised residual test statistic as modified by Boehmer, Musumecci and Poulsen (1991) in a series of tests on data in which a random event was specified and injected with an artificially enlarged return, and abnormal returns were generated in relation to it. With respect to the bid quotation method, one-tailed tests on this data had slightly exaggerated rejection rates, but two-tailed tests performed well. However the lumped return method had an exaggerated one-tailed test rejection rate. Further, Kallunki observed the behaviour of cumulative abnormal returns and found that all of the methodologies produced rejection frequencies that were accurate within a five percent level of error. Given this, all three methodologies could be seen as legitimate tools for dealing with the non-trading phenomenon if used in conjunction with the Boehmer, Musumecci and Poulsen (1991) modification of the Patell standardised residual test.

Thin trading in the form of zero volume trading is a feature even of the world's largest markets. However in the American context, the effect of it may have been masked by the way CRSP has dealt with it — and this may have conditioned the results in large body of Finance research conducted over the past decade or so. Effectively, in some instances, the CRSP has recorded a non-zero value closing trade in its files where no trade actually occurred at all. In an appendix to their paper on transaction costs, Lesmond, Ogden and Trzcinka (1999) performed an analysis of types daily trading (or absence of daily trading) of American stocks traded on the NYSE and AMEX and tracked by CRSP.

These authors noted that the CRSP takes account of broking specialists' bid and ask quotations along with closing prices. The way this works is that the daily closing price will be established by a trade in which either a buyer chooses to transact at an existing ask quotation, or a seller sells at an exiting bid quotation. However, when no trade occurs in a day, the CRSP sets the stock value for the day at the midpoint between the closing bid and ask quotations of the day. This kind of averaging will have disguised the effect of thin trading in American studies.

Lesmond et al categorised daily returns as falling into two classes (positive volume trading and zero-volume trading) and seven subclasses,[113] each of which was associated with a particular level of a variable which can loosely be called 'new information'. These subclasses are based on activity between investors and the specialists.

There are four subclasses associated with positive volume trading in which the CRSP records positive or negative returns in two instances (1 and 2), and zero-value returns in the others (3 and 4):

1. The CRSP records a non-zero return. The closing bid quotation on day t_0 is different from the closing bid from day t_{-1}; and the closing ask quotation is also different from the previous day's closing ask quotation. The final trades of both days were settled at either a bid or an ask price — but there was no shift between days from bid to ask, or from ask to bid. New information is present.
2. The closing price of day t_0 and of day t_{-1} are the same; and bid and ask quotations have remained unchanged over the two days. However, the CRSP records a non-zero return on the ground that the final transaction on day t_0 is based on a buyer's acceptance of an ask quotation whereas on day t_{-1}, it was based on a seller's acceptance of a bid quotation (or vice versa). Lesmond et al see this as being indicative of no new information being present. In accordance with Conrad, Kaul and Nimalendran (1991), they call this a "true" return of zero.[114]
3. The closing price of day t_0 and of day t_{-1} are the same, and it was based on a bid quotation that has not changed since day t_{-1} — or alternatively, on an unchanged ask quotation. This is also a "true' zero return. The CRSP registers a zero return.
4. There is no change in stock price between the two days; but the transaction is based on neither existing bid or ask quotations. This is indicative of liquidity trader activity and an absence of new information. Nevertheless the CRSP records a zero return.

There are three subclasses associated with zero-volume trading on day t_0 in which the CRSP records a zero-value return in only one instance (7):

5. The CRSP records a non-zero return on the basis that specialists' bid and ask quotations have changed since the close of day t_{-1} (when there was trading). This is indicative of the presence of new information.

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[113] Lesmond, Ogden and Trzcinka (1999), p. 1137
[114] Ibid, pp. 1137 – 1138.

6. The bid and ask quotations have not changed from day t_{-1}, which did have an actual closing trade. The CRSP records a non-zero return on the ground that there is a change from a day t_{-1} trade price that was not the average of the closing bid and ask quotations to the average. There is no new information
7. The CRSP records a zero return on the ground that there have been no trades on day t_0 of day t_{-1} and the bid and ask quotations have not altered.

Lesmond et al deemed five of the seven categories to be instances of what they called "effective' zero returns. They went on to examine NYSE- and AMEX-listed stocks between 1988 and 1990 for the frequency of zero returns and "effective" zero returns. The stocks were partitioned into size deciles. They noted that the smallest decile firms furnished effective zero daily returns on 54 percent of all days on which the market was open for trading. The decile information for CRSP zero returns and effective zero returns is reported in Table 2-1.[115]

Table 2-1: Company Size versus Incidence of Zero Value Returns in US Data.

Size Decile	CRSP Zero Returns (%) (3)+(4)+(7)	Effective Zero Returns (%) (2)+(3)+(4)+(6)+(7)
1 (Lowest)	43.69	54.09
2	36.80	45.64
3	33.34	40.61
4	30.77	37.11
5	27.58	33.59
6	25.67	33.48
7	21.69	27.74
8	19.70	24.07
9	16.04	18.69
10	11.80	13.62

2.3.4 Comment on Prior Research

Effectively, the problem of thin trading has been recognised; but no universal panacea has been developed for working with it in Finance research. The promising modifications by Scholes and Williams, by Dimson and by others have not been found to have been any better than a simple OLS regression approach that ignores the existence of thin trading. More recently Kallunki's (1997) investigation of alternative techniques for substituting values in for zero-trade days was interesting; but none of his methods coincided with the fill-down approach employed by Abeyratna (1994) and in Chapters 4 and 5 of the current study. Kallunki's closest method to the fill-down approach was his "lumped return" method, where no-trade days were removed from the sample and expected returns were calculated on the remaining shrunken sample, while zero-

[115] Ibid, p. 1139.

value ARs were directly assigned to no-trade days. According to Abeyratna (1994) and the first methodology employed in the current study, the no-trade days were awarded a zero-observed-return and were included in the expected return computation — which is quite inferior. Innovations offered in the next two sections and in chapters 6 and 7 remedy this shortcoming.

But there is another, even more important finding in the research record discussed above. The CRSP has disguised the thin-trading effect in the United States by treating no-trade days the way that it does. The fact that there is no equivalent of CRSP in New Zealand massaging daily trading results in the same manner means that there is an important difference in the nature of the available data — and we cannot necessarily expect to estimate results that turn out to be the congruent from both data sources.

2.4 A First Methodology Addressing the Thin Trading Effect: Models of Friction

Friction models are relevant because the zero returns associated with an absence of trading on particular days, or over sequences of days of a company's shares, can be modeled explicitly in terms of a zone of insensitivity that is inert to concomitant changes in market returns. This zone of insensitivity is quarrantined, in a maximum likelihood procedure, so that the values of the parameter inputs into expected returns are not biased by it. Further, the division of the dependent variable (company returns in log form) into three zones — one of which is 'insensitive' — gives rise to viewing the dependent variable as a limited dependent variable. A review of limited dependent variable (LDV) friction modelling literature is provided in this section, while the full explanation as to how this methodology fits the current study is provided in Chapter 6. I will start with the history.

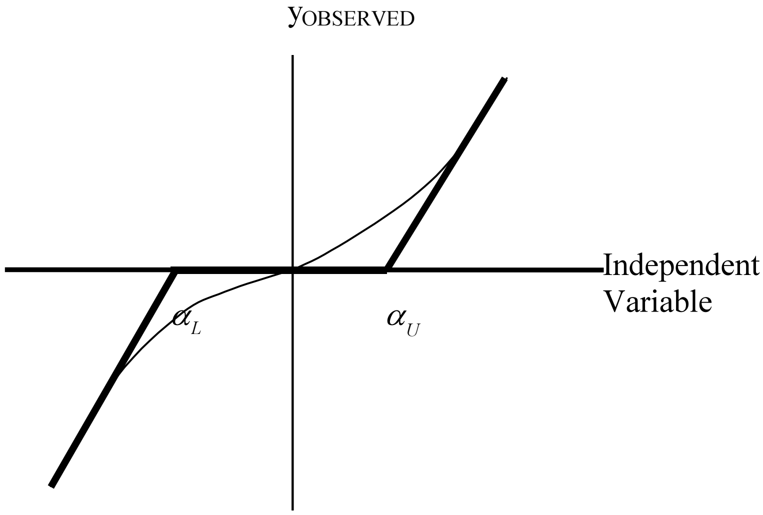
The insensitivity of a dependent variable to small changes in the state of relevant independent variables has been called 'friction' in economics jargon for well over half a century. The usage was cited as being traditional by Rosett (1959), when he presented the first friction model, and, indeed, coined the term 'friction model' to describe it. He provided a succinct description of what the model does with respect to the embedded employment of the statistical methodology of maximum likelihood estimation[116]:

> *The maximum likelihood method for estimating relationships with limited dependent variables is generalized to include relationships in which the dependent variable, over some finite range, is not related to the independent variables.*

[116] Rosett (1959), p. 263.

Effectively, the value of a given dependent variable changes in response to changes in value of a particular independent variable over most of its range, but not all of it. Over the finite range Rosett was referring to, the pressures for change on the value of a given dependent variable exert no effective influence on it, and the value does not change. Indeed, the marshaled influences for change cannot overcome the pressures for maintaining the status quo as the 'friction' is too great. However, the range exists between an upper bound and a lower bound. Above the upper bound, the pressure for an upward change in the dependent variable's value overcomes this friction and it moves upward; and conversely, below the lower bound, the pressure for downward change overcomes the friction and the variable takes on new lower values.

Figure 2-1: Schematic Diagram of a Friction Model.



The focus of Rosett's interest was in mapping how changes of yield impacted on how much of an asset would be held by investors in their portfolios. His model is laid out in Figure 2-1[117] where the observed values of a response variable *Y* (asset holding) are plotted against an independent variable (yield). The observed y values are clustered close to the heavy black line and indeed are zero between the bounds α_L and α_U where pressure for change on *Y* is unable to overcome friction. The thin curve through the origin depicts the theoretical path of *Y* in the absence of that friction.

The bounds, the slope of the line and the standard deviation of the underlying distribution are all parameters of the LDV Friction Model and are determined by maximum likelihood estimation.

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[117] Rosett (1959), Figure 1, p. 263. However, in Figure 2-1 above, the terminology used follows Figure 6.2 on p. 164 of Maddala (1983) more closely than Rosett's original figure's terminology. However, Rosett's and Maddala's figures and mine are equivalent. Maddala (1983) provided an excellent summary of friction models in general.

Maximum likelihood estimation itself is a technique for determining parameter values that make the pattern of data we have observed most likely to have occurred in that particular pattern. A very useful aspect of it is that it does not require strict adherence to the linearity assumption required by OLS regression. It makes most sense if maximum likelihood estimation is explained from first principles. In terms of basic statistical analysis, we are often interested in determining the probability of an event *Y* conditional on the occurrence of *X*, which is expressed as $P(Y|X)$. *X* may be a variable denoting an event or a state. However, *X* might be replaced by "*p*" (for parameter), as it may actually be a parameter of the distribution of *Y* itself. Maximum likelihood estimation is about solving $L(p|Y)$, where L is the likelihood function of *p* given *Y*.

2.4.1 General Review of Friction Model Literature

DeSarbo, Rao, Steckel, Wind and Colombo (1987) developed a friction model to explain and forecast a firm's product-pricing decision. The most interesting aspect of their modelling was in their computation of the upper and lower bounds delimiting the price-no-change continuum and a prediction of by how much a price change would be expected to exceed these bounds. A vector of variables, $\mathbf{X}_t$ was compiled to represent pressures that would cause decision-makers to revise the price upward, and a second vector, $\mathbf{Y}_t$ was compiled representing price-reduction pressures. Each of these was modelled in terms of a simple OLS regression on a latent variable r_t and l_t from which the slope parameters could (notionally) be obtained, and for which it was assumed the error terms would be homoskedastic, uncorrelated over time and normally distributed:

$$\begin{aligned} r_t &= \mathbf{X}_t\beta + e_{1t} \\ l_t &= \mathbf{Z}_t\gamma + e_{2t} \end{aligned} \tag{2.5}$$

The magnitude and direction of the pressure for price change, utilising Equation (2.5) above, (positive for an increase and negative for a price decrease) was:

$$f_t = r_t - l_t \tag{2.6}$$

The absolute value of f_t would have to be larger than the absolute values of the upper and lower bounds (denoted k_1 and k_2) to trigger a price-change decision. Hence the friction model was specified as:

$$\begin{cases} \text{If } f_t > k_1, & \Delta P_{(increase)} = \alpha_t = f_t - k_1 \quad (\alpha_t > 0) \\ \text{If } f_t < k_2, & \Delta P_{(decrease)} = |\delta_t|, \ \delta_t = f_t - k_2 \quad (\delta_t < 0) \\ \text{If } k_2 \le f_t \le k_{1,} & \Delta P = 0 \end{cases} \tag{2.7}$$

In Equation (2.7) above, k_1 and k_2 do not necessarily have the same absolute value; and for the purpose of maximum likelihood estimation, which makes use of logarithms, these two bounds and f_t are treated as positive values. However, citing Dharmadhikari and Joag-dev (1985)[118] who found that the maximum likelihood function may be multimodal with more than one set of estimates, DeSarbo et al calculated the parameter values k_1, k_2, β, γ and σ via a controlled random search procedure modified from Price (1976).[119]

DeSarbo et al then applied their methodology to 82 weeks of mortgage interest rate information from 15 Philadelphia banks and found that their friction model outperformed equivalent forecasting computations generated from OLS and a Box-Jenkins procedure.[120]

Forbes and Mayne (1989) set out to examine the behaviour of the prime lending rate (compiled as the monthly average of US banks' annualised daily prime rates). The prime rate tends to remain unchanged and therefore apparently unresponsive to changes in money market rates unless these move above or below some pair of tolerance limits. Their model was as follows, where CD is the price of 90-day certificates of deposit on the secondary market, and P_t is the prime interest rate:

$$Y_{jt} = \alpha_j - \beta P_{t-1} + \lambda_0 CD_t + \lambda_1 CD_{t-1} + \lambda_2 CD_{t-2}, \quad j = 1, 2 \tag{2.8}$$

In Equation (2.8), Y_{jt} was the expected change in the prime rate; and given the values of j in the above, the full formal friction model specification became:

$$\begin{cases} \Delta P_t = Y_{1t} + \varepsilon_t & \text{if} \quad (Y_{1t} + \varepsilon_t > 0) \\ \Delta P_t = 0 & \text{if} \quad (Y_{1t} + \varepsilon_t < 0 \ \text{ and } \ Y_{2t} + \varepsilon_t > 0) \\ \Delta P_t = Y_{2t} + \varepsilon_t & \text{if} \quad (Y_{2t} + \varepsilon_t < 0) \end{cases} \tag{2.9}$$

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[118] DeSarbo, Rao, Steckel, Wind and Colombo (1987), p. 308

[119] Ibid, p. 308

[120] Ibid, p. 312. With respect to the comparison with OLS, the friction model produced an Akaike Information Criterion (AIC) of 83.67 versus an AIC from OLS of 103.52.

In Equation (2.9) the error term, ε_t had zero mean and variance σ^2; and the boundaries of the prime rate's no-change zone were provided by the values of α_j in Equation (2.8). The expected value of ΔP_t in the case of positive changes in Equation (2.8) was $Y_{1t} = \alpha_1 - \beta\left(p_{t-1} - R_t\right)$; while $Y_{2t} = \alpha_2 - \beta\left(p_{t-1} - R_t\right)$ modeled the expected value where changes in P_t were negative.

Forbes and Mayne's use of first differences, ΔP_t, with respect to the prime rate, reduced the complexity of the maximum likelihood function as the no-change zone value of the variable could be represented by the single point, zero. This was possible because there was only one set of primes and one matched data set of independent variables.

Nevertheless, the nonlinear nature of the first-order derivatives of the log-likelihood function required that the Newton method be used for solving the likelihood equation iteratively.

Forbes and Mayne used monthly data that were averaged from daily rates, and which covered US bank figures published in the Federal Reserve Bulletin for the decade from January 1977 to August 1987.

Almekinders and Eijffinger (1996) used friction modelling to shed light on the US dollar – Deutschmark exchange rate (daily data) in the period February 1987 to October 1989 with respect to market interventions by the US Federal Reserve and the Bundesbank. In addition, they observed the US Federal Reserve's interventions in the US dollar – Japanese yen market.

Almekinders and Eijffinger stressed that central banks tended not to intervene very often on the ground that the main function of an intervention was to send a signal to private traders, alerting them to the banks' preferred direction of exchange-rate change. Indeed, there were two good reasons behind this. First, while their intervention volumes could be in excess of a hundred million dollars, central banks never traded (and were not able to trade) more than a small fraction, by volume, of overall trading in any given day. Therefore the banks could not determine the market by brute force and had to rely on persuasion. Second, any attempt at micromanagement by frequent intervention would diminish the efficacy of the signalling function.

In friction model terms, the default or 'no-change' policy was that of non-intervention by the central bank, while above an upper bound, Θ^+ it would be expected to execute trades to drive the exchange rate down (from the central bank's own perspective). Conversely the lower bound, Θ^- was defined as the point at which it intervened in the market to push an unfavourably low exchange rate upward. The authors' dependent variable was *INV*, the volume (in millions of dollars) traded by a particular central bank when intervening, and the full model was:[121]

$$\begin{cases} INV = (X\Omega+\mu)\text{-}\Theta^{+} & \text{if } (X\Omega+\mu)>\Theta^{+}, \\ INV = 0 & \text{if } \Theta^{-} \leq (X\Omega+\mu) \leq \Theta^{+}, \\ INV = (X\Omega+\mu)\text{-}\Theta^{-} & \text{if } (X\Omega+\mu) < \Theta^{-} \end{cases} \tag{2.11}$$

In (2.11) $\boldsymbol{X}$ was a matrix of explanatory variables, $\boldsymbol{\Omega}$ was a vector of coefficients, and $\boldsymbol{\mu}$ was a vector normal i.i.d. residuals. Underlying their use of the above formulation, Almekinders and Eijffinger used a GARCH-in-Mean model to characterise the stochastic process that the two exchange rates under investigation followed, finding that a random walk model with a GARCH error term fitted their data better than did a Gaussian random walk.[122] One of their most important findings was that central banks intervene to lower exchange rate volatility. Therefore one of the banks' functions clearly was to manage (and this usually meant *minimise*) uncertainty for market participants.

Hashimoto and Takatoshi (2004) employed a friction model to examine contagion effects in Asian markets between exchange rates and share prices. Among their results, the authors found that the Thai exchange rate was sensitive to shocks in the stock markets of other Asian countries.

With respect to the impact on exchange rates, Hashimoto and Takatoshi employed a dependent variable, y^* which was the observed rate of change in a variable *DRR*, which was calculated daily, where *DRR* itself was defined as a measure of weighted five-day cumulative daily exchange rate changes. Their independent variables, denoted x' in Equation (2.12), included differences in domestic and other Asian stock prices, and the difference between home and other Asian exchange rates. The authors' friction model entailed the maximum likelihood estimation of an upper and a lower bound (a_1 and a_2) beyond which an exchange rate movement could be ascribed to spillover from the independent variables as distinct from just noise movement:

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[121] Almekinders and Eijffinger (1996), p.1374. The analyses of interventions in a particular foreign exchange market by each central bank were kept separate.
[122] Ibid, p. 1373.

$$y^* = x'b + e$$
$$\begin{cases} y^* < a_1 & y < 0 \\ a_1 \leq y^* \leq a_2 & y = 0 \\ a_2 < y^* & y > 0 \end{cases} \tag{2.12}$$

In setting out to investigate the cost of raising capital in a pecking order theory context, Galpin (2004) used a friction model to map a firm's financing function. The decision to raise new capital (either debt or equity represented by the subscript *i*), or to return it to investors, was dependent on the size of the associated transactions costs. Where NF_i^* represented the capital financing decision and τ^i represented all transaction costs, Galpin's model was:

$$NF_i = \begin{cases} NF_i^* - \tau^i : NF_i^* > \tau^i \\ NF_i^* \ : NF_i^* < 0 \\ 0 : \ 0 \leq NF_i^* \leq \tau^i \end{cases} \tag{2.14}$$

In Equation (2.14) the top line represents the decision to raise capital with the constraint that the amount raised must be greater than transaction costs, while the middle line describes the negative cash-flow case in which return of funds to investors is optimal; and the bottom line covers the situation where the raising of capital has insufficient value to the firm to overcome the related transaction costs.

2.4.2 Friction Models relating to Dividend Research

The papers cited in this section tend to be developments grounded in the work of Lintner (1956) which go on to investigate the presence and nature of dividend signalling — Cragg (1986) peripherally, and Kao and Wu (1994) in some depth.

Cragg (1986) developed a measure of firms' target dividend payout ratios and used friction modelling to model their perceived dividend-setting behaviour along the path toward that target. He started with Lintner's (1956) concept that firms will leave their regular dividend unchanged if there is a danger that a proposed change of dividend might turn out to have been in the wrong direction. Hence any change occurring in the short-term future must be a justified change given managerial perceptions of risk. With respect to this existence of risk element, Cragg was also interested in the degree to which the dividend change decision would be sensitive to changes in the macroeconomic environment. His formulation of the target payout ratio ρ for a firm *j* was:

$$\rho_j = r_0 + r_1 N_j + r_2 \frac{\beta_{j0}}{s_j} + r_3 \frac{\beta_{j1}}{s_j} + r_4 \beta_{j2} \tag{2.15}$$

In this regression the variable N_j was a one-period measure of per-share capital expenditure requirement; and the remaining three independent variables were the coefficients obtained from a prior interceptless regression of Y_t (national income), one-period change in national income (ΔY) and lagged earnings (E_{t-1}) on earnings at time *t*:

$$E_{jt} = \beta_{j0} Y_t + \beta_{j1} \Delta Y_t + \beta_{j2} E_{jt-1} + \varepsilon_{jt} \tag{2.16}$$

However, most of Cragg's efforts went into satisfactorily defining the bounds delimiting the decision to leave dividends unchanged. (Above the upper bound, the firm would be likely to increase the dividend, while below the lower bound, the dividend would be expected to be reduced.) These bounds, ξ_{jtL} (lower) and ξ_{jtU} (upper) were determined from forecasts generated by Equation (2.15) on company *j*. Cragg's model was somewhat complex, taking some 30 specifications of equations to complete. In its final form Cragg's friction model was:

Lower bound:

$$\xi_{jL} = \alpha_{jL} - \gamma_j \left(E_{jt} - \upsilon_j \varepsilon_{jt} - \frac{D_{jt-1}}{\rho_j} \right) \tag{2.17}$$

Upper bound:

$$\xi_{jU} = \alpha_{jU} - \gamma_j \left(E_{jt} - \upsilon_j \varepsilon_{jt} - \frac{D_{jt-1}}{\rho_j} \right) \tag{2.18}$$

$$\begin{aligned} P(D_t = D_{t-1}) &= \int_{\xi tL}^{\xi tU} N(\eta_t; 0, \sigma^2) d\eta_t \\ f(D_t > D_{t-1}) &= N\left\{ D_{jt}; \rho_j \left[\gamma_j (E_{jt} - \upsilon_j \varepsilon_{jt}) + (1-\gamma_j) \frac{D_{jt-1}}{\rho_j} - \alpha_{jU} \right], \rho_j^2 \sigma_j^2 \right\} \\ f(D_t < D_{t-1}) &= N\left\{ D_{jt}; \rho_j \left[\gamma_j (E_{jt} - \upsilon_j \varepsilon_{jt}) + (1-\gamma_j) \frac{D_{jt-1}}{\rho_j} - \alpha_{jL} \right], \rho_j^2 \sigma_j^2 \right\} \end{aligned} \tag{2.19}$$

Cragg then ran his model on a data set of 218 US companies whose fiscal years coincided with the calendar year and for which at least 20 years of continuous price information was available between 1959 and 1982 from spliced Compustat Industrials tapes. The companies were required to have made some dividend payments within the timespan; and indeed, the annual incidence of dividend-no-change decisions made by these companies ranged from a low of 9.1% in 1979 to 55.7% in 1971.

Cragg concluded that firms did indeed only change their dividends when there was only a low probability that the change would have to be reversed in the future. He noted[123] that firms' lower bound tended to vary to a much greater degree than their upper bound. In a signalling sense, this implied that firms are much more uncertain about when to cut dividends than they are about when to raise them. This certainly fits with the proposition that dividends are sticky in a downward direction (Lintner 1956), and that firms do not reduce dividends unless they are under financial pressure to do so. He noted that while neither bound depended on the company's level of investment needs, they did vary substantially with changes in the parameters calculated for the firm's earnings record. However although this variable and national income did appear to have a systematic impact on dividend policies by firm type, Cragg noted his model was not strongly enough specified to explain irrefutably the nature of this relationship.

With respect to signalling theory, which was fairly well developed by 1986, Cragg pointed out that a number of questions about the role of dividend policy as a signalling device had not been answered satisfactorily by researchers such as Bhattacharya (1979, 1980). In particular, why should a firm invest a substantial amount of dividend cash in order to convey a signal when the same signalling function could possibly be achieved by maintaining a low but consistent dividend payout ratio? Given that Lintner (1956) had demonstrated that dividend decisions did indeed "follow an easily comprehended, simple pattern,"[124] Cragg argued that the signalling function itself was theoretically very simple; yet it was clear that firms exhibited a wide range from low-cost to high-cost policies in their dividend choices. But with respect to his friction model he added the caveat that a more tightly specified model would potentially shed greater light on the signalling function.

Kao and Wu (1994) developed a friction model examining the relationship between changes in a firm's permanent earnings and its dividend policy, and found there was a positive relationship between the two variables. Kao and Wu's model was developed from one formulated by Marsh

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[123] Ibid, pp. 204 – 205 and Table 10.4 (lower panel).
[124] Cragg (1986), p. 191.

and Merton (1987), that had no friction aspect to it, which, in turn, was developed grounded in Lintner (1956) and which had examined the same two variables in aggregate on a value-weighted NYSE index and from CRSP data for the period 1927 – 1980. Kao and Wu themselves used quarterly share price and dividend data provided by COMPUSTAT on 454 firms 1965 – 1986. The starting-point of the Kao and Wu model is shown in Equation (2.20). This was Marsh and Merton's model with an extra final term added to account for post-announcement change in share price:

$$\begin{aligned}\log \bar{D}_t &= a_0 + \lambda \log\left(P_{t-1} + D_{t-1}\right) + \left(\gamma - \lambda\right)\log P_{t-2} \\ &\quad + \left(1-\gamma\right)\log D_{t-1} + \delta\left(\log P_t - \log P_{t-1}\right) + \varepsilon_t\end{aligned} \tag{2.20}$$

In Equation (2.20), $\bar{D}_t$ represents the desired (but unobserved) level of dividend that is a continuous variable which corresponds with the firm's (unobserved) beliefs about future earnings, while *D* is the observed dividend that is paid and *P* the firm's share price, which stands as Kao and Wu's proxy for permanent earnings. The three parameters λ γ and δ are also important. λ represents the current adjustment of the dividend as a proportion of prior period permanent earnings (in other words, 'smoothing'), while γ represents an error-correction that moves the current dividend towards the long-run target payout ratio, and δ is the coefficient which, if significant and positive, indicates that dividends contain an information signal.[125]

While Cragg's (1986) model was fairly traditional in containing three partitions (change down, no change, change up) and determined its bounds endogenously, Kao and Wu adopted a *K*-level model in which each observed value of the dividend paid, D_t was a discrete level. This meant that the continuous variable, $\bar{D}_t$ could be considered to be frozen into a 'no-change' state defined by its falling on or between actual observed values (log D_t) acting as boundaries. Hence in Kao and Wu, change was defined as a shift from one 'no-change' state to another across observations — or as they put it, a "stepwise movement of dividends over time".[126] The values of $a_0, \lambda, \gamma, \delta$ and σ were obtained by maximising the following log-likelihood function:

$$\log L = \sum_{t=1}^{M}\sum_{j=0}^{K} d_{tj} \log\left[\Phi\left(\frac{L_{j+1} - E\left(\log \bar{D}_t\right)}{\sigma}\right)\right] - \Phi\left(\frac{L_j - E\left(\log \bar{D}_t\right)}{\sigma}\right) \tag{2.21}$$

[125] Kao and Wu (1994), p.48.
[126] Ibid, p. 45.

Here, L_j stands for each bound separating the K partitions, M is the number of dividend observations, while $\Phi(\cdot)$ is the cumulative distribution function for a standard normal variable, σ the standard deviation of the error term, and d_{tj} is a dummy variable with a value of one when the desired dividend falls within the j^{th} partition, or zero otherwise.[127] All of the parameters in Equation (2.20) were found to be strongly significant.[128]

Then, with respect to dividend signalling, some of this output was redeployed to determine how well the signal δ could be explained in terms of a number of company-specific variables including two measures of risk (β, σ^2), percentage change in equity financing (ΔCE), the debt/equity ratio (*D/S*), percentage change in net investments (ΔI), earnings volatility (*VOL*), earnings persistence (*PER*) and company size. The smoothing parameter from Equation (2.20), δ was also included:

$$\begin{aligned} {}^{1}\!/\!_{\delta_i} &= b_0 + b_1\beta_i + b_2\sigma_{ei}^2 + b_3\Delta CE_i + b_4\left({}^{D}\!/\!_{S}\right)_i \\ &\quad + b_5 VOL_i + b_6 PER_i + b_7\Delta I_i + b_8\lambda_i + b_9 SIZE_i + w_i \end{aligned} \tag{2.22}$$

The coefficient b_8 for the smoothing variable, λ turned out to be negative and strongly significant, indicating that dividend smoothing positively enhances the dividend signal. Only two other independent variables furnished coefficients significant within a five percent level of error. These were market risk, β and percentage change in net investments, ΔI. *SIZE*, however, was weakly significant at the ten percent level of error.

More generally, Kao and Wu concluded that dividends are strongly related to the estimated level of a firm's permanent earnings, and that dividend changes are reactions to both expected and unexpected changes in the latter. Further, they considered that their friction model had successfully coped with the estimation problem associated with the tendency of firms to leave their dividends unchanged from period to period. In addition, their results showed that the concept of dividend signalling did not conflict with Lintner's (1956) concept of a partial adjustment towards a long-term target payout ratio. Instead, they found that their sample firms' dividend-setting behaviour was consistent with both.

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[127] Ibid, pp 54 – 55.
[128] Ibid, p. 62. See Table 4.

2.4.3 A Friction Model relating to the Market Model

Lesmond, Ogden and Trzcinka (1999) used a friction model to obtain estimates of effective transactions costs associated with marginal traders' buying and selling shares. They argued that the method was a viable alternative to the use of the sum of the bid-ask spread and commission approach that was considered to be current orthodoxy. The friction model approach required only sets of time series of daily security returns. The incidence of zero returns (for days of either no change in price or even days on which the stock fails to trade at all) was a phenomenon that could be turned to good account in terms of a friction model approach as it was in the nature of investor decision-making for zero trades to occur where the potential return to be made was not expected to exceed a threshold imposed by the cost of the trade.[129]

Lesmond et al's model was specified in terms of two return variables. One was the "true" return R^*_{jt} on a stock j predicted by the market model with the intercept suppressed, which would vary continuously with changes in the market. The second was the observed return on the stock, R_{jt} which was subject to friction. The observed return would be zero unless the true return exceeded the bounds α_{Uj} and α_{Lj} (where α_{Lj} is expected to take on a negative value); and the difference $\alpha_{Uj} - \alpha_{Lj}$ measured the total round trip transaction cost for purchase and sale of stock j. The model was:

$$R^*_{jt} = \beta_j R_{mt} + \varepsilon_{jt} \tag{2.23}$$

Where:

$$\begin{cases} R_{jt} = R^*_{jt} - \alpha_{Lj} & \text{if} \quad R^*_{jt} < \alpha_{Lj} \\ R_{jt} = 0 & \text{if} \quad \alpha_{Lj} < R^*_{jt} < \alpha_{Uj} \\ R_{jt} = R^*_{jt} - \alpha_{Uj} & \text{if} \quad R^*_{jt} > \alpha_{Uj} \end{cases} \tag{2.24}$$

It is of interest that Lesmond et al's model assumed that the market model was the correct model of security returns, and that the intercept term captures the effect of any misspecification of the market index relating to mean-variance inefficiency.[130] However, Lesmond et al suppressed the

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[129] Lesmond, Ogden and Trzcinka (1999), p.1115. The authors noted that zero returns are a frequent phenomenon, even with respect to firms listed on the NYSE and AMEX in the period they studied which was 1963 – 1990. They noted, "…[A]s much as 80% of the smallest firms returns are zero and some of the largest firms have 30% zero returns."

[130] Ibid, p.1120.

intercept term in their model. The values of α_{Uj} and α_{Lj} were calculated, as in most other friction model studies, by maximum likelihood estimation (MLE).

The current study adopts Lesmond et al's model as a replacement for the Market Model in estimating expected returns and ARs.

However, while Rosett and Lesmond et al employed one independent variable, the current study goes on to develop an LDV friction model employing multiple independent variables to model the trading reaction of investors in response to the event window announcement of dividend and earnings news.

I now turn to a second methodology which provides some insight into and mitigation of the effect of thin trading.

2.5 A Second Approach to Mitigating Thin Trading: State Asset Pricing Models

Norsworthy, Gorener, Morgan, Schuler and Li (2004), a conference paper presented at the 2004 Canadian Economics Association Conference in Toronto, developed a four-state asset pricing model that — they argued — computed expected returns superior in accuracy to those computed by the Market Model and also multifactor models.[131] The authors' intention was to show that three properties of Kahneman and Teversky's (1979) prospect theory were discoverable in the output of this superior expected returns analysis. The three properties were reference frame dependence, loss aversion, and, with increases in magnitude, diminishing sensitivity to marginal losses and marginal gains. While a full and serious consideration of prospect theory is beyond the purview of the current study, the first two characteristics are relevant as they have a bearing on reactions to the dividend-and-earnings announcement event.

Norsworthy et al developed three versions of their model which they compared with the Market Model.

The first version simply entailed the partitioning of returns by the nature of the company-return and market return combination. The four possible combinations of company return and matched market return (+ +, + — , — +, and — —) each occupy a quadrant on the plane defined by

[131] This conference paper was the successor to an earlier working paper, Norsworthy et al (2001) which was cited and tested out in a French context by Jokung and Meyfredi (2003). Norsworthy et al make the claim about superiority to existing multifactor models on the basis of comparing their results with those summarised and discussed by Cochrane (1999). A broad study of assets pricing models is outside the focus of interest of both Norsworthy et al and the current study — which is interested in the four-state model in terms of what it can tell us about dividend signalling.

market return and company return axes. Reference frame dependence could be demonstrated if this partitioning increased the model's explanatory power over that of the Market Model on the ground that it would indicate that investors did pay heed to market context. Norsworthy et al found that the unimproved Market Model furnished a mean adjusted r^2 0f 0.1646 with respect to the 100 firms for which they had data sets, while their partitioned model produced an adjusted R^2 of 0.5513. This was a three-fold improvement in explanatory power. Further, the coefficients of their partitioned model had tighter standard errors and lower p-values. This improvement is unsurprising if one takes into account that more information about the dependent variable is used in the calculation by the partitioning.

The authors' second and third models involved a rotation procedure which accounted for investor expectations of the daily return given the mean of past returns. With rotation and no further changes, the mean adjusted R^2 went up to 0.6508[132]. In terms of their investigative intentions, the authors interpreted this as evidence that investors are strongly reference frame-sensitive.

Norsworthy et al's CRSP data set contained daily returns for 100 companies from 1984 to 1998, of which 30 were Dow-Jones industrials, 30 were middle-range firms with market capitalisations of between $1 and $5 billion dollars, and 40 were deemed to be small companies listed on the Standard and Poors Small Cap Index. These last 40 had capitalisations of less than $1 billion. The authors' results showed that, of the three firm categories, it was the very large firm subsample (Dow-Jones industrials), that reliably yielded the highest adjusted R^2 statistics.

Jokung and Meyfredi (2003) applied the four-state model, as described in Norsworthy et al's earlier working paper version disseminated in 2001, to French data. Further, they proposed a third version of the model in which the axes were not rotated, but were translated. However, the effect of partitioning the data combined with translated axes was only a slight improvement on the effect of partitioning of the data alone. The rotated four-state model remained superior to both in terms of explanatory power. Jokung and Meyfredi used daily returns on 34 stocks contained in the French CAC40 Index from February 1997 to July 2002. Their prime purpose was to test the four-state model for the stability of its betas and they found that the unrotated, rotated and translated versions of the model all furnished betas that were more stable than those of the Market Model. They also observed a transfer between market risk and non-systematic risk

[132] The two rotated models were very similar. The difference was the one had a symmetry requirement built into it. In terms of adjusted R^2s obtained from the rotated procedure with symmetry, these were slightly inferior to those obtained without the symmetry requirement. The model with the symmetry requirement is ignored in the current study.

— the four-state model registered non-systematic risk (the size of the model's alpha terms) as being much lower.

But for the current study, the relevance of the rotated and unrotated partitioned models lies in the increased explanatory power of the computed expected returns. Norsworthy et al said of their model[133]:

> *The 4-state APM [Asset Pricing Model] may also provide a more systematic framework for event studies. Specifically, taking into account the contemporary movement of the market by partitioning may make it easier to identify departures from the patterns expected on the basis of no-effects of a given event. A false event signal may be generated or a true event signal obscured by a contemporary change in the direction of market returns.*

The question to be asked at this point is, is there a discernible movement in company returns on day t_0 that can be ascribed to the quality of an announced dividend in the joint dividend and earnings announcement environment? And in addition, there is a second question. What results are obtainable if a further 'state' is brought into the model to account for the presence of zero company returns?

At this point I will move on to considering the the research question, the data and hypotheses, and return to examining the nuts and bolts of the basic method in more detail. However I will leave further examination of friction model and state model methodologies until Chapters 6 and 7.

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[133] Norsworthy et al, p. 32.

3 Research Question, Data Collection, Market Model Method and Hypotheses

3.1 Introduction

The question that is asked is, do investors in New Zealand react to joint dividend and earnings announcements made by listed companies in a manner that suggests they are acting in reliance upon a dividend signal? Observations of this reaction will primarily be restricted to short-term movements in share prices on the New Zealand Stock Exchange (NZX) at and near the time of the announcement; and the units of measurement will be daily abnormal returns (ARs) and cumulative abnormal return (CARs) over a multi-day span.

However, while earlier studies of joint dividend-and-earnings announcement signalling effects have made use of the Market Model with a restricted least squares regression component, this event study goes on to address possible shortcomings that have become apparent in an 'off-the-shelf' employment of this methodology with respect to New Zealand's thinly traded share market. While all three of the methodologies — Market Model, Friction Modelling, and State Asset Models — make use of expected and abnormal returns to at least some extent, the fine details of only the Market Model will be discussed in this chapter. The other two methods will be disclosed in detail in Chapters 6 and 7.

The current chapter is laid out in the following manner. In Section 3.2 the research question (which is independent of methodology) is tabled. Section 3.3 discusses the sourcing and selection of data, and the cleaning that was necessary to bring it up to a useable standard. Next, in Section 3.4, the details of event study methodology (as applied to the detection of dividend signalling in New Zealand) are tabled and explained. Section 3.5 then ends the chapter by presenting the hypotheses that will be used throughout this thesis.

3.2 The Research Question: Is there a Dividend Signal?

This may be broken down into two groups of sub-questions:

1. What is the nature of the signal sent in a joint dividend and earnings announcement? In particular, can it be defined as a promise of future company profitability that can be retrospectively verified?

2. Can we detect the presence of a signal by observing how investors react to joint dividend and earnings announcements? What are these reactions in the short term?

The second of these two sub-question groups is what most of this part of this thesis spends its time answering. The disclosure to the market of new information, according to the Efficient Markets Hypothesis, should cause the share price to adjust swiftly to a new level. If the new information is a message in the form of a raised dividend that the company is going to be more profitable than hitherto, then that price adjustment will be upward. In terms of an event study based on Market Model methodology, this adjustment will be captured in terms of a statistically significant positive abnormal return (AR) on (or closely about) the day of the announcement. The fact that there is an upward jump in price can be construed as evidence investors do believe there is a dividend signal and that they are acting on it. But, so far, this is circular reasoning.

If the investor reaction is indeed a reaction to specific dividend-related information, there should be a statistically significant relation between the nature of the information and the nature of the reaction. If there is no clear correlation, then investors cannot be said to be acting in reliance upon a signal. But if there is such a correlation, then they can be said to be acting in reliance. However, this does not tell us if the signal is a true one or not — it only shows us something about the trading investors' belief sets concerning what an increase in dividends might mean.

Now let us consider what the dividend signal might be signalling. This falls into the second group of sub-questions. Lintner (1956) argued that firms would only raise dividends if they believed they could sustain the dividend at the new higher level — which implied the expectation of a higher level of earnings in the future. Miller and Modigliani (1961), in conceptualising the dividend signal, posited that it was this expectation of improved long-term future earnings that was the signal's content. However, a dividend signal cannot say such a thing — it may only imply it. It remains a hint which investors might pick up and act upon. The truth of it will be seen in the record of earnings furnished by the firm in subsequent years. This thesis looks at future earnings record — but only briefly.

But managers, like the rest of us, are not omniscient beings and are not prescient. They may get their predictions wrong. But does that make a dividend signal which is acted upon as a signal any less true as a signal if it eventually turns out to have been misleading? I believe not. If there is a misleading signal, then it is a true, wrong signal. As pointed out by Miller and Rock (1985), paying dividends is costly to the firm; so therefore raising them to send a false signal would further harm mediocre profitability. Further, there would come a time when the raised dividend could no longer be sustained; and such a reduction appears to be seen by investors as a negative dividend signal and has definitely been associated with immediate falls in market share price (Aharony and Swary (1980), Woolridge (1982), Eades, Hess and Kim (1985), Healy and Palepu

(1988), and Christie (1994)). Therefore one would not ordinarily expect to find duplicitous as distinct from mistaken signalling.

If markets are truly efficient, the AR recorded in response to a news disclosure should be a relatively isolated phenomenon. It will be larger than the ARs recorded on the days preceding it, and larger than those on the following days too. If there is a lazy drift of positive ARs of similar size that are significantly different from zero over some as yet unspecified number of days after the announcement, there is an implication that the share market is not efficient and that investors might be able to execute profitable trades, at leisure, as the share price slowly adjusts. This would be indicative of an inefficient market. Therefore, one of the important implications associated with the group 1 sub-questions is whether or not we are operating in an efficient market. Event study methodology, developed by Fama, Fisher, Jensen and Roll (1969), is closely related to, and reliant upon the concept of semi-strong market efficiency. If, in the period leading up to the announcement event, the share market is efficient and movements in prices (in the absence of the publication of new information) are random about a long-term mean, then one would expect ARs and CARs to be negligible and statistically indistinguishable from zero.[134] During the announcement period, however, there will potentially be a measurable AR (or CAR) spike as the share price adjusts to a new level incorporating the published information — if indeed there is any new information furnished in the announcement. Beyond that, if the New Zealand share market exhibits semi-strong efficiency, there will be a return to the pattern of negligible, statistically insignificant ARs as soon as the event period has passed.

From these considerations it is possible to develop the series of hypotheses laid out in Section 3.5. But before then it is necessary to develop the language in which they are couched. This entails defining variables and explaining in more detail how the Market Model works

3.3 Selection of Data, its Sources, and the Cleaning of it

In this subsection data sources are described and a rationale is provided for use of 1990s data; and then the data is described.

3.3.1 1990s Share Price Data

The daily share price data used in this study is drawn from the New Zealand Stock Exchange between the first trading day in January 1990 and the last trading day in December 1999. An

[134] This long-term mean is proxied in the study by expected returns. Since these are calculated as a function of market returns, they are market risk-adjusted. However, they can only be generated over the period in which there is no publication of new information, which ends with the publication of the dividend and earnings announcement.

immediate reason for the choice of this decade was that the data was available in electronic archived form for almost all companies individually, and a gross value-weighted NZX All Companies Index. This data was published in CD-ROM form by a Wellington data collection firm, IRG Ltd.[135] More recently, some extra data series were obtained directly from the NZX itself.

This study started in the late 1990s and the data set was gathered at that stage and updated in 2000. An interesting extension would be to investigate more recent data.

3.3.2 Company Reports Data

Throughout the 1990s, listed companies were required to furnish mid-year and end-of-year financial reports.[136] These reports have been sourced for the current research from IRG CD-ROMs containing all company disclosures to the Stock Exchange. The mid-year set of reports was known as an 'interim result' and furnished information relating to a company's financial record for the six months since the start of the company's year. The end-of-year set, released for dissemination by the NZX as a 'preliminary result', furnished information covering the company's full financial year. Both sets of information were furnished with comparative figures from the previous interim or preliminary report published twelve months earlier. To avoid confusion, the terms 'mid-year' and 'year-end' will be used in place of 'interim' and 'preliminary'.

Since the NZX was a small market and not all companies furnished dividends, it was necessary to collect dividend and earnings information from both preliminary (year-end) and interim (mid-year) disclosures. This exposed the current research to the danger of treating, as if identical, two types of announcement as potentially different as apples and oranges. Hence, the calculation of percentage changes in dividends and earnings declared in mid-year announcements made use of the equivalent mid-year data from the previous company financial year (apples were compared with apples). Similarly, the percentage changes in year-end dividends and year-end earnings were based on the change from those in the preceding year-end announcement (oranges compared with oranges).

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[135] IRG Ltd's full name is Investment Research Group Ltd. This firm has had a recent name change. The previous name was Datex Ltd. It is to be noted that where company information was not available electronically, the company concerned was not included in the sample.

[136] Semi-annual reports had actually been a requirement since 1973; however, the exact specification of the content of the half-year report was not formalised until 1976. Bradbury (1991) observed the half-year disclosures furnished by listed companies in the intervening period and found that interim dividend-paying firms had higher levels of interim disclosure.

The data contained in both mid-year and year-end reports was summary rather than comprehensive in nature, and tended to be unaudited; but nevertheless was sufficient to furnish a good snapshot of a company's financial health in lieu of the formal, audited annual financial statements, which the company finalised and furnished on paper at a later point in time.

With respect to dividends per share, both the mid-year and year-end announcements had a format which stated this explicitly along with the comparative figure for twelve months earlier. Hence, if a dividend was omitted, this information became known at the time of the particular announcement. Hence the non-publication of a dividend in itself had news value. This meant that it was feasible in the current study to report dividend omissions as an explicit information event, with the dividend of twelve months earlier standing in stark contrast to the absence of a matching figure for the period just ended. Kalay and Loewenstein (1986) made the point that the need for a dividend reduction tended to cause managers to delay announcing the drop. In the New Zealand context this would entail delaying the entire financial reports disclosure to the NZX, which enforces a time limit for these disclosures. Where a firm goes over the limit, it is warned — and with no disclosure forthcoming, delisted.

The dividend-per-share data set was compiled from the announcements of all companies listed on the NZX between January 1990 and December 1999, which met the criteria listed in the following section.

3.3.3 Cleaning the Announcement Data

Not all announcements in the 1990s could be used, the following outlines the problems and the process of removing problematic announcements.

In the first instance, the companies needed to have announced and paid dividends. Alternatively, they needed to have omitted a dividend following a previous payment.

In the second instance, an individual company index of closing daily prices, adjusted for share splits and dividend pay-outs, was required to be on the CD ROMS provided by IRG Ltd.

The third requirement was that there had to be no confounding event announced by the company within the announcement itself, or released the same day, published in the preceding ten days, or published in the ten days following the announcement (within the 21-day test period). Confounding data was checked for by compiling a list on an Excel spreadsheet of the 10,460 release titles of all announcements (of every kind) made by the all of the dividend-announcing companies, sorted by chronological order for each company. The test period surrounding each mid-year and each year-end announcement was then vetted for the presence of unacceptable announcements. In addition, the text of each individual dividend-bearing announcement was itself checked for any confounding data not disclosed in the announcement title. The following items caused a dividend announcement to be dropped from the sample:

1. Announcements of special dividends
2. Announcements of changes in capital structure with respect to debt
3. Share buybacks and other announcements of capital reduction
4. Earnings forecast announcements
5. Bonus share issue announcements
6. Rights issue announcements
7. Announcements concerning options
8. Announcements of impending take-overs
9. Announcements of company revaluations
10. Follow-up announcements of revisions of erroneous data in an announcement
11. Requests published by the NZX requiring a company to explain unusual (and potentially suspicious) changes in the market price of its shares

An initial tally of possible announcement events was 1910 announcements. This covered companies which made at least one dividend announcement in the 1990s. When there was no dividend after an initial year of dividend omission, the announcement was dropped from the tally (but the announcement in which the initial omission occurred was kept in). This dropped the number to 1048 possible observations. Removal of announcements contaminated with the listed confounding items dropped the available sample to 958 events.

Dividend announcements were also deleted from the sample if the company was delisted within the ensuing six months or if a merger was in progress.

The fourth requirement was that any mid-year or year-end announcement used in the sample must fall at least 111 market days after the preceding announcement, irrespective of whether the preceding announcement was 'mid-year' or 'year-end' in nature. This rule ensured that 110 days of closing prices free of contamination from prior announcements would be available for the Market Model's estimation period and ten days of test period leading up to the day of the announcement. The nuts and bolts of this estimation process are discussed in Section 3.4. It is of note that this time-lapse requirement effectively removed all quarterly dividends from the sample. Hence, the Telecom Corporation of New Zealand Ltd, New Zealand's biggest listed company in the 1990s and a major contributor to changes in any market-weighted price index such as the NZX 40 and indeed, the NZX all ordinaries price index, does not feature in the sample past the end of 1995, which was the point at which this company's dividends became payable quarterly.

A variation on this 110 days rule was as follows: 110 market days were required between the start of the available price index (usually 3rd January 1990) and the date of the first acceptable announcement if (and only if) the company was already listed earlier and had made at least one year's worth of mid-year and year-end announcements back in the 1980s. This brought data-points into the sample which would otherwise have been rejected simply because appropriate IRG Ltd price history indices did not extend back past the start of 1990, even though the relevant announcement data was available from the start of 1988 onward.

After the 110-day rule was applied and several events were found to be contaminated by proximity to their company's delisting, the final tally of usable events dropped from 958 to 948.

Dividend data was collected from IRG Ltd's archival versions of the announcements which survived the above weeding procedure. However, a further vetting procedure was needed. Over the decade from the start of 1990 to the end of 1999, the NZX made occasional changes to the content it required from companies in their mid-year and year-end financial results, and also altered the tabular format in which this data was formally presented to the public. In particular there was a significant change in disclosures mandated in 1995 which flowed through to announcements as of May 1996.[137]

This 1995 disclosure and format reform had two implications concerning the data collection for this study. One of these concerned dividends and the other was related to earnings per share figures. The dividend implication (and a related dividend matter) will be dealt with first. Until May 1996, the year-end announcement contained dividend information concerning the final dividend only. From that time onward, the year-end announcement no longer reported the final dividend, but disclosed the cumulative annual ordinary dividend instead. The current study is based on the use of final dividends as distinct from cumulative dividends. Hence, latter-year final dividends needed to be separated out from the published cumulative data-points. IRG Ltd did furnish this information separately for most companies in the form of company-specific summary tables of ordinary dividend disbursements and, in addition, in the form of company-specific diaries of payment data for dividends of all kinds. These extra IRG dividend information sources also served as a check on the accuracy of the archived announcements, which from time to time contained contradictory data and/or clerical transcription errors.

With respect to mid-year dividend data, some companies furnished more than one 'interim' (mid-year) dividend in a financial year. A case in point was Cavalier Corporation Ltd.

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[137] See the New Zealand Stock Exchange Listing Rules, issued by the Exchange in September 1994 and updated in 1995. In particular, see Appendix 1 (Rule 10.4), revised April 1995.

Throughout the 1990s, this company paid a first interim dividend in February/March which was announced in the company's mid-year financial result published in February. Cavalier Corporation then paid out a second interim dividend in December, which was quite independent of the final dividend announced in August and usually paid in November. As the study in hand is about dividend signalling in a joint dividend-and-earnings announcement context, 'second interim' dividends announced at times other than in mid-year and year-end announcements are excluded from the data set. Hence, the cents per share dividend (DPS) figure associated with an mid-year financial results announcement is not the cumulative interim dividend, but simply the individual dividend item (incremental dividend) disclosed in the mid-year announcement.

The second change was in the disclosure of earnings per share (EPS) information. Prior to 1996 when the reform took effect, EPS information was not explicitly stated at all. It was missing from the summary tables provided as part of the announcement, and usually not stated in the accompanying text. But from May 13th 1996 onward, the missing EPS information was disclosed in both mid-year and year-end announcements.[138]

With respect to the missing information prior to mid 1996, the general public had to make do with disclosures of profit before and after extraordinaries, and before and after unusual items. If investors wanted to estimate earnings per share for themselves, they had to undertake the separate exercise of seeking out numerical data on companies' outstanding shares elsewhere.

This time-based inconsistency was solved in the study by calculating an earnings per share data point to match each dividend announcement data point in the sample prior to May 1996. Again, the information came from IRG Ltd, which furnished a capital table for each company, containing the required summary figure of ordinary shares outstanding as of the end of the company's financial year. The EPS estimate was calculated by dividing this figure into an earnings figure available in the actual year-end or mid-year announcement. This earnings figure was net profit after tax and before adjustment for extraordinaries. In the case of year-end announcement EPS calculations, the shares figure was concurrent. In the case of mid-year announcement EPS calculations, the relevant shares figure was the one available for the end of the previous company year. It is to be noted that EPS is secondary in importance in this study as the thrust of the investigation is the impact of dividend information and how it interacts with earnings information irrespective of how that earnings information was packaged for publication to investors. It may well be the case that investors made use of some alternative measure of

[138] The final two non-disclosing announcements in the sample were both dated May 8th 1996.

company earnings performance such as net profit after tax and before (or after) extraordinaries unadjusted for the number of shares outstanding.

3.3.4 Other Announcement Complications and Resolutions

The 948 observations were gathered from 127 listed companies in accordance with the guidelines laid out in the previous subsection. However, several more aspects of the selection process become cogent at this point. The first is that there are entities other than formally constituted companies with listings on the NZX; a second, that some companies have multiple listings on the NZX; and a third is that some companies are listed on more exchanges than just the NZX.

With respect to the first of these issues, the sample was restricted to company observations. This meant that observations relating to NZX-listed trusts, that would otherwise have been eligible, were excluded. Although a small number of trusts such as the Kiwi Income Property Trust and the National Property Trust appeared to perform like limited liability companies and did pay dividends, they were deleted from the sample on the assumption that investors might behave differently with respect to trusts.

The second issue was slightly more complex. Where a listed company split itself into a series of separate share-issuing entities within one group, and the share-issuing entities were autonomous companies, the individual entity observations were included in the sample. The only relevant instance of this in the 1990s was when Fletcher Challenge Ltd redesigned itself as Fletcher Challenge Ltd Forest Division, Fletcher Challenge Ltd Energy Division, Fletcher Challenge Paper Division and Fletcher Challenge Building Division. Each of these 'Divisions' was a large company, by New Zealand standards, in its own right. However, where a firm separately listed more than one type of ordinary share, only one type was included in the sample. There was one example of this. Air New Zealand Ltd in the 1990s had 'A' shares which any New Zealand investor could buy and 'B' shares for overseas investors. The 'B' shares have been ignored in this study.

The third complication arose from the advent of listing on multiple exchanges. A small number of significant New Zealand companies are listed on the Australian Stock Exchange (ASX) and in the United States in addition to being leading lights on the NZX and in the New Zealand economy. Conversely, a number of companies with listings elsewhere and head offices located offshore, are listed as foreign companies on the NZX. This 'foreignness' is to some extent, an artificial construct. One company, Macraes Mining Company Ltd, was a New Zealand firm which switched to being foreign by administrative decision. The Guinness Peat Group and

Goodman Fielder Ltd are examples of foreign companies with tremendous economic influence in New Zealand and a large role on the NZX. In all, nine companies of this sort were included in the sample because they could furnish NZX price histories and files of locally released announcements.[139]

3.3.5 Representative Sample

The 127 companies in the data set cover all areas of legitimate commercial activity conducted in the private sector in New Zealand. A descriptive list is provided in Appendix B This list contains, for every announcement observation, the company's name, the acronym under which it was listed, its industry code (as defined by the NZX in its annual "Sharemarket Review" — and later, the annual "Fact Book"), and a brief description of its principal activities which was sourced from "The New Zealand Company Register". In addition, the list contains the calendar date of each announcement and whether it was made mid-year or at the company's year-end.

3.4 Event Study Methodology - and how it pertains to this Study

3.4.1 Section Introduction

The method used in Chapter 5 of this thesis (but not later) is the event study as used by Kane, Lee and Marcus (1984), Easton and Sinclair (1989), Easton (1991) and Lonie, Abeyratna, Power and Sinclair (1996) to separate out the earnings and dividend components in half-yearly financial disclosures to the NZX and the nature of the associated change in share price. The key concept in event study methodology is an abnormal return. This is a measure of how a share price can be deemed to react to the specific stimulation provided by the arrival of the news item that is the 'event' of the event study. ARs are calculated via a CAPM-based mechanism called the Market Model, which furnishes risk-adjusted expected returns. The AR on the day of the announcement (or some CAR spanning the time of the announcement) is then used as the regressand in a cross-sectional regression on independent variables based on earnings per share and dividends per share. The Market Model entails a simple ordinary least squares (OLS) regression employing the natural log of company returns as the dependent variable and the natural log of returns on the market index (also referred to as market return) as the independent variable.

These concepts are expanded upon in following subsections:

3.4.2 How the investor reaction to an event is defined.
3.4.3 Definition of the terms used to explain time periods.

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[139] Although these foreign companies can be deleted from the sample, the primary results tabled in the next chapter include them. But they were found to make no appreciable difference to the results.

3.4.4 Calculation of company and market returns.
3.4.5 Calculation of risk-adjusted expected returns and abnormal returns.
3.4.6 Check if there is any significant change in returns on any day in the test period.
3.4.7 Define change in earnings (ΔEPS), change in dividends (ΔDPS) and associated dummy variables.
3.4.8 Specification of the Restricted Least Squares (RLS) regression procedure to determine the relationship between dividends and earnings announcements and abnormal returns.

Some technical details and software used are in Appendix D.

3.4.2 How an Investor Reaction to an Event is defined

The primary focus of the study is on the presence and nature (or absence) of the event window spike in ARs. It will furnish evidence of an investor reaction to a joint dividend-and-earnings signal simply by being present and measurable. But is it always present? And does it change its nature in response to the conjunction of dividend characteristics and earnings characteristics announced? In other words, are investors influenced by the interaction of dividend and earnings information presented together in a single announcement? And if so — how? For the purpose of hypothesis testing, the maximum probability of a Type One error (hereafter 'Type 1') will be five percent.[140]

The investigation will primarily be cross-sectional in nature rather than in depth with respect to particular companies; and the main methodological vehicle will be the event study as described below.

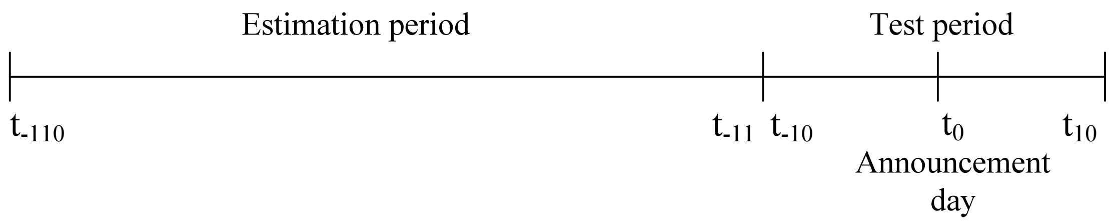
3.4.3 Time Period Terms

The time period terms used in the study are depicted in Figure 3-1. All time periods are relative to the day of the announcement, and so it is considered as day zero, denoted t_0. An event window (not shown) is typically either just the day of the announcement or a small number of days centred on the day of the announcement. In the study, three-day and one-day event windows will be employed. The event window is used to determine investor reaction to the announcement. The test period is a larger span of days centred on the day of the announcement, denoted t_{-10}:t_{10}, and incorporate the event window. This is not included in the regression to find the relationship between the market index and the company return as leakage of the announcement may have occurred in this period before the announcement. The test period has been set in this study at ten days before day t_0 and ten days afterward, totalling 21 days. Its main purpose to to provide a background against which the behaviour observed within the event window can be compared. If

[140] This error occurs when the alternative version of a hypothesis is allowed, when the null form was an accurate representation of underlying phenomena.

ARs are small and uninteresting in the test period outside the actual event window and there is an AR spike in the event window itself, then the contrast of the spike relative to the lowlands on either side of it is indicative of an investor reaction to the news in the event window. The last term of note is the estimation period. This is the period in which risk-adjusted expected returns are formulated and calibrated. It is one hundred days prior to the test period, and is denoted t_{-110} to t_{-11}. One hundred days is chosen as it is a reasonable trade-off between having sufficient points in the regression for it to be trustworthy and not excluding too many announcement/events from the study because of the presence of a previous announcement. An estimation period may not include a previous announcement event as this could be seen as contaminating the calibration of expected returns used in determining the abnormal returns in the test period and event window.

Figure 3-1: Time Period Terms.



3.4.4 Company Returns (R_{it}) and Market Returns (R_{Mt})

Company Returns (R_{it}) can be thought of as the proportional change in adjusted daily closing share price (P_{it}).[141] The subscript '*i*' will be used to denote a particular company's announcement, and the subscript '*t*' to refer to a particular day. The returns are computed in terms of the natural log of the price on day '*t*' divided by the price on the preceding trading day '*t*-1':

$$R_{it} = \ln\left(\frac{P_{it}}{P_{it-1}}\right) \tag{3.1}$$

The natural log of returns should help to overcome the skew to the right in returns. Analogous to Equation (3.1), the return on the market for the same period is calculated from the New Zealand

[141] The adjusted closing priced series is furnished by IRG Ltd. The daily closing prices have been adjusted for the effects of stock splits and dividend payments.

Stock Exchange's daily all-companies gross index, the NZX Index,[142] as the natural log of the index value for day t divided by the previous day's index value:

$$R_{Mt} = \ln\left(\frac{P_{Mt}}{P_{Mt-1}}\right) \tag{3.2}$$

In this equation, R_M is the return on the market (proxied by the gross index) and P_M is the gross index's closing value.

3.4.5 Calculation of Expected Returns and Abnormal Returns

The supposed underlying concept of using the Market Model is to remove the 'noise' of changes in the market. It uses OLS regression to find the relationship between the market return and a particular company's return on the basis that this relationship is assumed to be linear:

$$E\left(R_{it}\right) = \alpha + \beta_i\left(R_{Mt}\right) \tag{3.3}$$

This can be read as the expected return for the company associated with announcement i on day t is equal to some intercept or offset term (α) plus a slope coefficient (β) times the market return for the same day. As stated earlier, this is a simplification of the standard CAPM. It differs from the CAPM only in that the CAPM subtracts a proxy of the risk-free rate of return from both market returns and company returns. Given the linearity assumption implicit in the Market Model, a measure of the accuracy or predictive power of the relationship between the market return and the company return is the r^2 statistic.[143]

The abnormal return is simply the actual return minus the expected return:

$$AR_{it} = R_{it} - E\left(R_{it}\right) \tag{3.4}$$

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[142] Two matters should be dealt with here. In the 1990s, the New Zealand Stock Exchange was not called the NZX, but was the NZSE. References to NZSE have been updated to the more modern nomenclature — NZX. Second, this gross index is adjusted for dividend payouts and is calculated in the following manner. Each company's last sale price of the day is multiplied by the company's current number of shares on issue, and the result is summed up over all companies. This numerator is then divided by the sum of each company's opening price for the day (again adjusted for dividends and multiplied by the company's current number of shares.) The result is then multiplied by the end-of-day index for the previous day. (NZSE: "The Fact Book for the Year Ended 31 December 1997," p.5.)

[143] An excellent background text with respect to OLS regression is Damodar Gujurati's "Basic Econometrics" (Third Edition).

In the estimation period AR_{it} would be described as a residual. CARs are simply the sum of the ARs over the specified time period. The use of addition is appropriate here as returns have been calculated in logarithmic form.

3.4.6 A Check for Significant Change in Returns on any Day in the Test Period.

Once output datasets of abnormal and excess returns have been generated, *t-test*s will be employed to determine whether or not the mean of the ARs for any particular day in the window differs significantly from zero. The ARs will then be summed into cumulative abnormal returns, CARs with respect to a three-day event window, the full test period and other cogent subsets of it.

3.4.7 Change in Earnings (*ΔEPS*), Change in Dividends (*ΔDPS*) and Dummy Variables

This event study looks at the relationship between the company's earnings and dividends simultaneously announced in the company report and their effect on the share price as shown by the abnormal return.

In an announcement event in which dividends per share (DPS) and earnings per share (EPS) are disclosed simultaneously, we immediately have two sets of variables to contend with. The first are the first-order variables, which are formulations of the relevant characteristics of the two announced items independent of each other. The second set contains interaction variables, which are formulations of the possible combinations of earnings change and dividend change considered jointly.

The two first-order independent variables are change in dividend per share, ΔDPS and change in earnings per share, ΔEPS. In the company's announcement disclosure to the New Zealand Stock Exchange (NZX), the dividend is announced in terms of cents per share; but we are not interested in a raw figure, but in some measure of improvement or deterioration of a firm's dividend performance. If we assume that the equivalent DPS in cents announced last year is a reasonable expected value for the DPS in cents that will be announced today, then the difference when we subtract last year's from this year's figure will be a raw measure of unexpected dividend change. However, to allow for standardisation across firms of different sizes and different sizes of dividend, ΔDPS is compiled by calculating the percentage change in DPS from the company's last announcement of the same type (ie mid-year or end-of-year announcement):

$$\Delta DPS = \frac{DPS_{ANNOUNCED} - DPS_{LAST\ YEAR}}{DPS_{LAST\ YEAR}} \tag{3.5}$$

This compilation accords with Abeyratna (1994) and Lonie, Abeyratna, Power and Sinclair (1996). It is elegant in that it can be interpreted as a simple percentage change. However, it has an annoying drawback. If there was no dividend announced (or paid) in the year prior to the current announcement event, then ΔDPS is not defined as the ratio has a denominator of zero. This knocks consideration of dividend initiations and resumptions (after periods of dividend omissions) out of the sample available for statistical analysis unless some arbitrary value is assigned to them — which, if assigned, distorts the results.

In Chapters 6 and 7 of the study, an alternative compilation is adopted which enables dividend initiations and dividend resumptions to be included in the sample. This alternative compilation is explained in some detail in Chapter 5, Subsection 5.5.1 where it is used for the first time. The second first-order variable is ΔEPS. It is compiled in the study in the same manner as ΔDPS — and where ΔDPS is later recompiled with P_{t-1} as a deflator, ΔEPS is similarly treated.

We now turn to the compilation of variables covering the nature of possible dividend-and-earnings interaction effects — the dummy variables. An announced dividend will fall into one of three possible categories: a dividend which has *increased* in magnitude over the one announced twelve months earlier (DI), a dividend that has *decreased* relative to twelve months previously (DD), and an announced dividend with *no change* in magnitude to its predecessor (DNC). Similarly, the announcement of earnings per share must either increase (EI), decrease (ED) or remain unchanged (ENC). These give rise to nine possible permutations of changes in dividends and earnings, but only the first two rows of Table 3-1 make economic sense.

Table 3-1: Nine Announcement Classifications.

DI-EI	DD-EI	DNC-EI
DI-ED	DD-ED	DNC-ED
DI-ENC	DD-ENC	DNC-ENC

With respect to the bottom row, occurrences of an "ENC" announcement are likely to be extremely rare. There are two reasons for this. Company profits cannot be tied by fiat to rigidly specified amounts, but instead fluctuate; and, second, the number of shares (and convertibles and options) a company has outstanding is relatively unlikely to remain static. Therefore reported earnings effectively go up or down, even if the reported changes may be relatively small. Dividends, on the other hand, are ordained by company policy and can be increased, decreased or kept at a constant level per share by company decision. Hence the permutations investigated in the study will be restricted to the following:

Table 3-2: Six Announcement Classifications actually used.

DI-EI	DD-EI	DNC-EI
DI-ED	DD-ED	DNC-ED

Of these, the DI-EI combination and the DD-ED combination would be expected to produce the starkest impact on the behaviour of ARs (and CARs), as they contain pairings that pull in the same as distinct from opposing directions. With respect to the two DNC combinations, one would expect the dividend to have little influence on investors, but for there to be some influence emanating from the rise or fall in earnings; but that this influence would be muted down by the 'DNC' aspect. With respect to the DD-EI and DI-ED combinations, the component changes pull in opposite directions. In these cases, one would expect that the impact on ARs would be strongly cancelled down by the countervailing influences.

Finally, a more general nomenclature can be applied to these dividend-and-earnings combinations. The DI-EI category of announcement, containing increases only, could be considered to be unadulterated good news for investors. DI-EI is often referred to as the 'good-news' category, while the DD-ED grouping by the same logic is known as the 'bad-news' announcement-type. Where one component rises and the other one falls, (DD-EI and DI-ED), the shorthand terminology is 'mixed-news' or 'mixed-message'. 'Mixed-news' (or message) is extended to cover the final two announcement types (DNC-EI and DNC-ED) on the basis that dividends and earnings are still behaving in a dissimilar manner.

From these the dummy variables are as defined in Table 3-3:

Table 3-3: Dummy Definitions.

Category	Dummy variable	English summary
DI-EI	D1	Good news.
DD-ED	Regression intercept term	Bad news.
DI-ED	D2	Mixed news or mixed message.
DD-EI	D3	
DNC-EI	D4	
DNC-ED	D5	

3.4.8 Restricted Least Squares (RLS) Procedure

In the second tier of estimations, the event-window AR (or CAR if cumulated) for each company/event will be treated as an observation in the set of ARs for all company/events, and used as the regressand in a cross-sectional regression involving measures of change-in-dividend and change-in-earnings as independent variables. This methodology has been employed fairly widely; and with respect to dividend signalling in a joint announcement context, has been used by Kane, Lee and Marcus (1984), Easton and Sinclair (1989), Easton (1991) and Lonie, Abeyratna, Power and Sinclair (1996). But the use of forecast errors as a measure of impact attributable to dividends harks back to Gonedes (1978), who found it to be insignificant. Gonedes used the errors associated with a regression based on Lintner (1956).

At this point, analysis of the joint nature of the dividend-and-earnings announcement will begin. The primary tool for this will be the RLS regression procedure utilising three-day event window CARs as the dependent variable or alternatively, with ARt_0 as the dependent variable (CAR3Day is shown):

$$\begin{aligned}
&(i) \quad CAR3day = \alpha + \beta_1 \Delta DPS + \beta_2 \Delta EPS + \beta_3 D_1 + \beta_4 D_2 \\
&\qquad\qquad + \beta_5 D_3 + \beta_6 D_4 + \beta_7 D_5 + \varepsilon \\
&(ii) \quad CAR3day = \alpha + \beta_1 \Delta DPS + \beta_2 \Delta EPS + \varepsilon \\
&(iii) \quad CAR3day = \alpha + \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + \beta_4 D_4 + \beta_5 D_5 + \varepsilon
\end{aligned} \tag{3.6}$$

In this RLS procedure, ΔDPS and ΔEPS are the procedure's first-order variables. The remaining independent variables (all called D) are interaction dummies, each representing one of the combined dividend-change and earnings-change categories as defined in Table 3-3.

The three regression runs of a restricted least squares procedure comprise an unrestricted regression and two restricted regressions. The differences among these lie in the exclusion of one of the types of independent variable — first-order or interaction dummy. The unrestricted regression employs both first-order and interaction dummy variables together, while the first restricted regression run employs the first-order variables alone and the second, the interaction dummies alone.

The joint significance of the first-order variables will be measured by a first-order *F*-statistic employing the residual sum of squares from the unrestricted run (i) and from the restricted regression with interaction dummy variables only (iii):

$$
\begin{aligned}
&(i) \quad CAR3day = \alpha + \beta_1 \Delta DPS + \beta_2 \Delta EPS + \beta_3 D_1 + \beta_4 D_2 \\
&\qquad\qquad + \beta_5 D_3 + \beta_6 D_4 + \beta_7 D_5 + \varepsilon \\
&(iii) \quad CAR3day = \alpha + \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + \beta_4 D_4 + \beta_5 D_5 + \varepsilon
\end{aligned} \tag{3.7}
$$

In the formula below, m is the number of restrictions (degrees of freedom associated with regressors omitted from the restricted run), N the number of observations and K the number of degrees of freedom lost in the unrestricted regression, which is the number of its regressors plus its intercept. The term RSS denotes the residual sum of squares (error sum of squares) from either the unrestricted or restricted equation.

$$
F_{FIRST\ ORDER} = \frac{\left(\dfrac{RSS_{RESTRICTED(EQN(iii))} - RSS_{UNRESTRICTED}}{m_{EQN(iii)}} \right)}{\left(\dfrac{RSS_{UNRESTRICTED}}{(N-K)} \right)} \tag{3.8}
$$

The joint significance of the interaction dummy variables will be measured by the interaction F-statistic, which is calculated from the residual sum of squares from the unrestricted run and the restricted run incorporating first-order variables only:

$$
\begin{aligned}
&(i) \quad CAR3day = \alpha + \beta_1 \Delta DPS + \beta_2 \Delta EPS + \beta_3 D_1 + \beta_4 D_2 \\
&\qquad\qquad + \beta_5 D_3 + \beta_6 D_4 + \beta_7 D_5 \\
&(ii) \quad CAR3day = \alpha + \beta_1 \Delta DPS + \beta_2 \Delta EPS
\end{aligned} \tag{3.9}
$$

The interaction F-test is:

$$
F_{INTERACTION} = \frac{\left(\dfrac{RSS_{RESTRICTED(EQN(ii))} - RSS_{UNRESTRICTED}}{m_{EQN(ii)}} \right)}{\left(\dfrac{RSS_{UNRESTRICTED}}{(N-K)} \right)} \tag{0.10}
$$

With respect to both first-order and interaction F-tests, the benchmark for rejection of the relevant null hypothesis will be found from an F-distribution, given the appropriate degrees of freedom information.

The interaction dummy variables, which have been ‘restricted’ out of Equation (3.9) (but shown in Equation (3.7) above), relate to the relevant permutations of direction-change in announced dividends and in the earnings jointly announced with them. Given n relevant direction-change categories, the unrestricted equation will contain n-1 dummy variables, as the regression's intercept term will furnish a coefficient modelling the relationship between the dependent variable and the n^{th} dividend-and-earnings direction permutation.

In the first instance, a simpler restricted least squares procedure in Equation (3.11) will be set up to investigate the effect of the direction of change in earnings only. This will entail setting up one dummy variable, 'E'. All announcements containing a rise in earnings from twelve months earlier will be assigned the value '1' while all those containing a fall in earnings will be assigned a zero. In the unrestricted run of the procedure, the coefficient of the intercept will capture the relationship between falling earnings and the dependent variable, CAR3Day.

$$\begin{array}{ll} (i) & CAR3day = \alpha + \beta_1 \Delta DPS + \beta_2 \Delta EPS + \beta_3 E + \varepsilon \\ (ii) & CAR3day = \alpha + \beta_1 \Delta DPS + \beta_2 \Delta EPS + \varepsilon \\ (iii) & CAR3day = \alpha + \beta_1 E + \varepsilon \end{array} \tag{3.11}$$

The second restricted least squares procedure in Equation (3.12) will ignore the direction-of-earnings content of announcements and employ two dummy variables, 'D'. One will represent a rise in dividend and the second will proxy a state of no change in dividend from twelve months earlier. The coefficient of the intercept will capture the relationship between a fall in dividends and the dependent variable, CAR3Day.

$$\begin{array}{ll} (i) & CAR3day = \alpha + \beta_1 \Delta DPS + \beta_2 \Delta EPS + \beta_3 D_1 + \beta_4 D_2 + \varepsilon \\ (ii) & CAR3day = \alpha + \beta_1 \Delta DPS + \beta_2 \Delta EPS + \varepsilon \\ (iii) & CAR3day = \alpha + \beta_1 D_1 + \beta_2 D_2 + \varepsilon \end{array} \tag{3.12}$$

Once the direction of the two announcement items have been separately considered, they will be considered jointly. This will entail a five-dummy restricted least squares procedure (Equation(3.7)) covering the six dividend and earnings announcement directions permutations.

The statistical significance of each discrete category and the ΔDPS and ΔEPS variables separately will be determinable from the regression's t-statistics. Further checks for statistically significant differences among the earnings and dividend classifications will be performed with nonparametric analysis. In particular, the Kruskal-Wallis test will be used.

In conjunction with all of the above, since mid-year announcements are being considered along with year-end announcements, some form of testing should be done to check whether the former produce CARs indistinguishable from those of the latter. This will be achieved by use of the Kruskal-Wallis test.

3.5 Hypotheses

3.5.1 Hypotheses Governing the Testing of Abnormal Returns

Much of the planned research lends itself to clear, falsifiable hypotheses in the sense of Karl Popper's use of the term. In this subsection, these will be built up in a sequential manner which parallels the presentations of results in ensuing chapters.

But before the study investigates three-day CARs, a simpler, humbler analysis of the behaviour of announcement day ARs will be investigated. The first hypothesis takes into account that the 'good-news' announcement of increases in both dividend and earnings (DI-EI) will be likely to be associated with a positive AR on announcement day, while the 'bad-news' announcement of joint decreases (DD-ED) is likely to produce a negative AR.

H_{01}: The abnormal returns generated on the day of the announcement and grouped by direction of change of dividend and direction of change in earnings category will be indistinguishable from zero at the five percent level of error.

H_{A1}: The abnormal returns generated on the day of the announcement, and grouped by direction of change of dividend and direction of change in earnings category, will be significantly different from zero at the five percent level of error.

This hypothesis also covers the four mixed-message announcement categories. In all four instances, one would predict in advance that the null hypothesis will not be rejected on the ground that the good and bad news components of the joint message would cancel each other out in investors' minds — and their consequent behaviour in the market would show no clear consensus. A failure to reject the null hypothesis can be interpreted as investors acting upon a dividend signal in opposition to the concurrent earnings signal. The action here amounts to a lack of action when averaged out. The primary tool available for testing each of the six categories separately covered by the hypothesis is the *t*-test.

However, so far, Hypothesis H_{01} has only covered the nature of the AR recorded on the day of the announcement without providing a context in which it can be seated. A significant AR on announcement day only becomes interesting if it is seen to be a spike on an otherwise flat plain of insignificant ARs generated beforehand and afterwards, as expected in terms of the semi-strong form of the Efficient Market Hypothesis. But with a minor change in its date reference, the hypothesis can be adapted to account for the predicted behaviour of ARs (in each category grouping) on each discrete other day in the 21-day test period. When the daily *t*-statistics and their associated p-values are lined up for all 21 days in chronological sequence, the pattern of AR behaviour and significance (or lack of it) can be seen by eye.

3.5.2 Hypotheses Governing the Testing of CARs

So far we have made the assumption that short-term reactions to information releases will occur on the day of the release. This may, however be a little restrictive. We can expect investors to become aware of the release of information to the NZX at various times about the temporal point of the actual release. Lonie, Abeyratna, Power and Sinclair (1996) employed a three-day span on their British data in this respect, which in terms of event study methodology is called a three-day 'event window'. In the current study too, the event window will be extended to encompass the day beforehand and the day afterwards. Hence, the alternative hypothesis can be restated with another minor change of wording:

H_{A2}: The mean three-day CAR generated over the days spanning the public release of the announcement (days t_{-1}, t_0 and t_1) and grouped by direction of change of dividend and direction of change in earnings category, will be significantly different from zero at the five percent level of error.

3.5.3 Hypotheses Governing the Joint Significance of Dividend and Earnings Announcement Combinations

In the previous two subsections, the existence of significant ARs and CARs associated with different categories of joint announcement was postulated; but the hypotheses related only to each of the six individual dividend-change-with-earnings-change categories separately. Now it is time to posit that the different dividend-and-earnings interactions are significant as a group and have an impact on investor behaviour that is distinguishable from that of the magnitudes of earnings change and dividend change. It is to be noted that, in a joint announcement context, these last two magnitude variables will confound each other unless there is some mechanism for separating their impacts out. A broad (but as yet inadequate) hypothesis covering this issue is as follows:

H_{A3}: The market reacts to interactions between dividend-change and earnings-change published in a joint announcement in a manner distinguishable from the separate impacts of percentage change in earnings announced and percentage change in dividend announced.

In itself, this H_{A3} lacks precision. However, a more appropriate hypothesis is reliant upon information about the method by which it is to be tested. The method (with respect to the Market Model methodological approach) is Restricted Least Squares (RLS) regression and its associated first-order and interaction F-tests. The first-order F-statistic provides a measure of the joint significance of the two autonomous first-order variables, while the *t*-statistics associated with each allows for judgement of that particular variable's unique contribution to that joint significance. Similarly, the RLS's interaction *F*-statistic provides a measure of the joint significance of the six paired-change combinations in concert, while their individual *t*-statistics enable judgement on each of the six separately within the group. These give rise to two hypotheses with respect to *F*-testing:

H_{A4}: The first-order variables, ΔDPS and ΔEPS are jointly related to CARs generated, during the three-day event window, by investor activity following joint announcements, as recorded by a first-order *F*-statistic that is significantly different from zero at the five percent level of significance.

H_{A5}: The six paired dividend-and-earnings combinations (DI-EI, DD-ED, DD-EI, DI-ED, DNC-EI and DNC-ED) modelled by five interaction dummy variables are jointly related to CARs generated during the three-day event window, by investor activity following joint announcements as recorded by an interaction *F*-statistic which is significantly different from zero at the five percent level of error.

These two hypotheses can then be narrowed in scope to consider the individual significance of any one of the independent variables in the unrestricted equation. For these, the decision criterion is the *t*-statistic and its associated *p*-value furnished by the regression procedure associated with the unrestricted equation. There are eight of these, so only one will be cited by way of example:

H_{A6}: The three-day CAR generated when the dividend-and-earnings interaction category DI-EI (represented by the dummy variable D_1), will greater than zero at the five percent level of error.

The hypotheses associated with Friction Model and State Model Methodologies are essentially the same set as above — with minor changes to allow for methodological differences.

The next chapter commences the tabling of results.

4 Descriptive Market Model-based Results

4.1 Chapter Introduction

In this chapter, the characteristics of the data generated by application of the Market Model are discussed. In Section 4.2, the distribution of the announcement events through the 1990s decade is discussed, while Section 4.3 discloses the characteristics of dividends announced and (later) paid. The final section, Section 4.4 discusses the characteristics of earnings per share.

4.2 Distribution of Company/events through Time

Table 4-1 shows how the company observations were distributed throughout the 1990s. The count for each year is broken down by dividend and earnings combination (the variable, DPSEPS). In the table, 'DD' denotes a dividend reduction, 'DI' a dividend increase, 'DNC' an unchanged dividend from a year ago, 'ED' an earnings decrease, and 'EI' and earnings increase. Panel A shows the composition of the full sample, while Panels B and C provide this information for the mid-year and year-end subsamples.

Table 4-1: Number of Announcements in Dataset by Year, Dummy Classification and Announcement Type.

PANEL A: Full Sample (948 Observations)											
DPSEPS	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**Total**
DD-ED	3	10	12	11	15	21	23	26	37	24	182
DD-EI	1	3	1	5	7	2	3	8	4	4	38
DI-ED	1	3	4	6	4	21	13	8	11	9	80
DI-EI	8	11	27	39	42	43	38	34	41	28	311
DNC-ED	9	13	7	13	12	23	40	35	28	17	197
DNC-EI	2	13	17	16	12	13	14	14	16	23	140
Total	24	53	68	90	92	123	131	125	137	105	948
PANEL B: Mid-year Subsample (432 Observations)											
DPSEPS	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**Total**
DD-ED	2	3	5	4	6	10	10	12	16	10	78
DD-EI		1	1	1	3	1	1	2	1	2	13
DI-ED			2	1		10	9	3	2	3	30
DI-EI	4	5	10	18	20	12	20	17	17	12	135
DNC-ED	5	8	3	8	7	14	16	17	14	8	100
DNC-EI		7	8	9	4	9	9	7	12	11	76
Total	11	24	29	41	40	56	65	58	62	46	432
PANEL C: Year-end Subsample (516 Observations)											
DPSEPS	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**Total**
DD-ED	1	7	7	7	9	11	13	14	21	14	104
DD-EI	1	2		4	4	1	2	6	3	2	25
DI-ED	1	3	2	5	4	11	4	5	9	6	50
DI-EI	4	6	17	21	22	31	18	17	24	16	176
DNC-ED	4	5	4	5	5	9	24	18	14	9	97
DNC-EI	2	6	9	7	8	4	5	7	4	12	64
Total	13	29	39	49	52	67	66	67	75	59	516

The dispersion of annual totals in all panels of Table 4-1 cannot be ascribed to any one cause. A possible reason for the low figures for the first two years may have been the prolonged recession in New Zealand following the 1987 Crash. However, in later years, the shift by some companies to quarterly reporting and the publication of confounding announcement data will have randomly reduced the possible datapoints down to the stated totals.

4.3 Characteristics of Dividend Announced and Paid

Table 4-2 furnishes the average dividend announced in the 948 dividend-and-earnings announcements. The figures are in New Zealand cents. The mean dividend, at 6.28 cents per share, is not large. It is to be noted, in the bottom row, that the range of averages throughout the 1990s is also quite tight with a minimum (5.35 cents) in 1990 and a maximum (7.03 cents) in 1995. Indeed, there was little overall growth in dividends in the final four years of the 1990s.

Table 4-2: Average Dividend Per Share in Cents from 1990 to 1999.

PANEL A: Full Sample (948 Observations)

DPSEPS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Overall Average
DD-ED	5.13	2.10	1.63	1.66	2.99	6.40	1.96	3.91	4.79	6.26	4.00
DD-EI	12.00	0.67	0.75	4.44	4.98	9.50	8.67	14.13	5.13	2.63	6.86
DI-ED	6.00	6.83	2.13	3.88	4.00	11.47	5.20	7.20	4.64	4.93	6.70
DI-EI	5.10	9.25	8.02	10.68	6.96	6.99	10.67	6.09	6.64	7.05	7.88
DNC-ED	4.94	5.71	6.14	3.92	5.42	4.46	7.07	5.66	6.56	5.85	5.81
DNC-EI	4.88	4.27	4.88	5.77	11.38	5.15	4.11	5.92	6.14	6.62	5.96
Overall Average	5.35	5.19	5.46	6.93	6.41	7.03	6.75	6.08	5.86	6.23	6.28

PANEL B: Mid-year Announcement Subsample (432 Observations)

DPSEPS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Overall Average
DD-ED	4.69	2.00	1.40	2.13	2.27	7.57	2.70	6.08	2.92	4.32	3.97
DD-EI		2.00	0.75	2.50	3.21	6.00	15.00	1.00	2.00	0.75	3.18
DI-ED			1.75	1.00		6.58	5.38	9.33	6.13	7.67	6.06
DI-EI	8.19	9.00	8.08	10.11	6.05	5.98	8.41	5.81	8.03	7.00	7.56
DNC-ED	4.80	6.17	4.96	2.74	2.93	4.31	6.27	5.10	6.39	6.59	5.20
DNC-EI		3.93	5.22	5.31	22.00	4.11	3.44	7.14	5.40	6.68	6.07
Overall Average	6.01	5.41	5.13	6.43	6.32	5.65	6.00	5.84	5.67	6.04	5.87

PANEL C: Year-end Announcement Subsample (516 Observations)

DPSEPS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Overall Average
DD-ED	6.00	2.14	1.79	1.39	3.47	5.34	1.38	2.06	6.21	7.64	4.01
DD-EI	12.00	0.00		4.93	6.31	13.00	5.50	18.50	6.17	4.50	8.78
DI-ED	6.00	6.83	2.50	4.45	4.00	15.92	4.80	5.92	4.31	3.56	7.08
DI-EI	2.01	9.46	7.99	11.16	7.79	7.38	13.19	6.37	5.65	7.08	8.12
DNC-ED	5.13	4.98	7.03	5.80	8.90	4.69	7.61	6.19	6.73	5.19	6.44
DNC-EI	4.88	4.67	4.58	6.36	6.06	7.50	5.30	4.69	8.38	6.56	5.84
Overall Average	4.79	5.00	5.71	7.34	6.48	8.18	7.50	6.30	6.02	6.38	6.62

This was related to a similar stasis in profitability in terms of earnings per share (Table 4-4 below). Both may have had their origins in macro-economic factors. Although the last four years were boom years for the United States and British economies (in spite of the flow-on impact of the Russians defaulting on their bonds in 1998), relatively tight monetary policy in New Zealand kept growth down. In particular, the East-Asian economic crisis (that began in 1997) pushed New Zealand towards a recession which was avoided in the neighbouring Australian economy by virtue of looser macro-economic policies.

With respect to the nature of dividends in terms of the type of announcement in which they were embedded, the final column of Table 4-2 contains the overall average dividend per share for the decade. The largest is 7.88 cents, achieved by the subset of announcements containing dividend *and* earnings increases (DI-EI category).

The second largest pay-out magnitude in Panel A of Table 4-2 (6.86 cents) was associated with announced decreases in dividends in conjunction with earnings increases (DD-EI category). It is possible that firms making this kind of announcement decided that retention of funds for positive net present value projects was preferable to raising or maintaining a dividend that, when reduced, was still relatively generous by New Zealand standards. The absolute size of the reduced dividend might even have been posited as a factor mitigating possible adverse investor reaction to the 'reduction' aspect. The number of observations of this sort, however, was quite small (38 in Table 4-1).

It is of interest that the third highest average dividend in Table 4-2 (6.7 cents) was paid by firms who decided to increase dividends in spite of falling earnings. This was just under a cent greater than the averages for the two categories of announcement containing no change in dividend. This does suggest an underlying belief, on the part of the decision makers in these 80 instances, that the earnings decline was going to be only temporary. Another interpretation of what is going on here is provided by Ghosh (1993) whose theory of regret posited that managers prefer to avoid cutting dividends (and even borrow to do so) if they think it is at all possible to manoeuvre their firm through the difficult times to a future return to profitability without dividend cuts and any associated share price drops. The theory entails managers knowing they would be proud if they succeed in doing so and feeling regret if their strategy turns out to be the wrong one. Managers are perceived as being risk-averse with respect to dividend policy — given that reducing a dividend is considered to be shackled to taking risks with the company's share price. This also fits with Partington (1989) who recorded that slightly more than 93 percent of Australian firms in his sample believed a dividend reduction would adversely affect their share price, and also Baker and Powell (1999).

The smallest average dividend in Panel A of Table 4-2 (4.0 cents) was furnished by the announcement combination in which both dividends and earnings were reduced (DD-ED category).

When the sample was observed as separate mid-year and year-end subsamples, the ranking of the averages by announcement type changed slightly. In the year-end subsample in Panel C, the largest average magnitude was furnished by the DD-EI announcements, with the DI-EI average in second place and the DD-ED average furnishing the smallest magnitude, as before. However, a more interesting phenomenon was the difference in magnitude between mid-year and year-end dividends. The year-end dividends were uniformly bigger.[144] This may be observed in the final columns of Panels B and C.

Next, the percentage changes (from twelve months earlier) in announced dividends were scrutinised. The averages are provided in Table 4-3. In this table, the final column shows the average dividend change by announcement category; and a distinction is made between reductions upon an existing dividend stream, and omissions, which are defined as the announcement of no dividend at all. This is a 100 percent drop from the level of the dividend announced at the equivalent time in the company's previous financial year.

A distinction is also made between increases upon an existing dividend stream and the initiation or resumption of dividends where no dividend occurred at the equivalent time in the previous company year. In Table 4-3, dividend initiations and resumptions are arbitrarily assigned a value of 1000 percent; but because any assigned value would still be arbitrary, no overall annual averages incorporating these initiation percentages is reported in the bottom rows of the three panels.[145]

With respect to the full sample in Panel A of Table 4-3, the average rise in the dividend of DI-EI announcements was 53 percent, which was larger in absolute magnitude than the fall of 35 percent in the DD-ED announcements. It is of interest that the 80 DI-ED announcements averaged a 46 percent increase in dividend. It is to be remembered, however, that the absolute magnitudes of the announced dividends were not dollars, but only a few cents, which made large percentage changes relatively less remarkable.

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[144] With respect to DD-EI announcements, the difference between mid-year (3.18 cents) and year-end (8.78 cents) was quite large; but the number of announcements (38 in total) was very small.

[145] In the next chapter, percentage change in DPS (ΔDPS) was used as a first-order variable in the Restricted Least Squares regression procedure. Any percentage change arbitrarily applied may change the nature of the results of the procedure. Therefore observations of initiations and resumptions were deleted from the sample.

Table 4-3: Average of Percentage Change in Dividend Per Share (DPS) from Twelve Months Earlier.

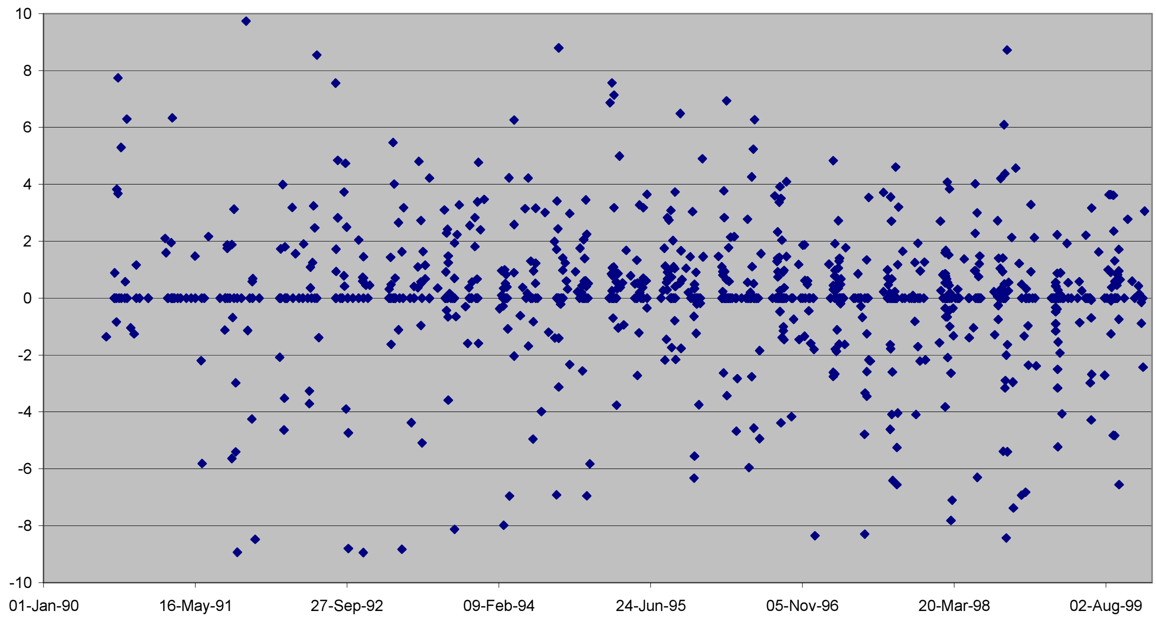
DPSEPS	Type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Avg
PANEL A: Full Sample (948 Observations)												
DPSEPS	**Type**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**Avg**
DD-ED	Reductions	-0.28	-0.41	-0.38	-0.19	-0.43	-0.31	-0.37	-0.41	-0.37	-0.29	-0.35
	Omissions		-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
DD-EI	Reductions	-0.14	-0.50	-0.85	-0.35	-0.16	-0.37	-0.45	-0.31	-0.30	-0.45	-0.34
	Omissions		-1.00		-1.00	-1.00			-1.00		-1.00	-1.00
DI-ED	Increases	0.09	0.23	0.38	0.23	0.96	0.31	0.44	0.77	0.69	0.42	0.46
	Initiations			10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
DI-EI	Increases	0.41	0.30	0.55	0.61	0.57	0.36	0.58	0.51	0.75	0.42	0.53
	Initiations	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
DNC-ED		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DNC-EI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PANEL B: Mid-year Subsample (432 Observations)												
DPSEPS	**Type**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**Avg**
DD-ED	Reductions	-0.26	-0.33	-0.39	-0.22	-0.46	-0.25	-0.39	-0.35	-0.36	-0.33	-0.34
	Omission		-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
DD-EI	Reductions		-0.50	-0.85	-0.38	-0.14	-0.60	-0.21	-0.33	-0.20	-0.50	-0.39
	Omission					-1.00			-1.00		-1.00	-1.00
DI-ED	Increases			0.25			0.44	0.28	1.08	0.10	0.11	0.42
	Initiations			10.00	10.00		10.00	10.00			10.00	10.00
DI-EI	Increases	0.39	0.26	0.45	0.52	0.65	0.40	0.62	0.40	0.54	0.30	0.49
	Initiations	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
DNC-ED		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DNC-EI			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PANEL C: Year-end Subsample (516 Observations)												
DPSEPS	**Type**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**Avg**
DD-ED	Reductions	-0.33	-0.42	-0.38	-0.17	-0.40	-0.36	-0.35	-0.49	-0.37	-0.26	-0.36
	Omission		-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
DD-EI	Reductions	-0.14			-0.34	-0.17	-0.13	-0.57	-0.31	-0.34	-0.40	-0.31
	Omission		-1.00		-1.00	-1.00			-1.00		-1.00	-1.00
DI-ED	Increases	0.09	0.23	0.50	0.23	0.96	0.20	0.65	0.46	0.86	0.55	0.48
	Initiations			10.00	10.00	10.00			10.00	10.00	10.00	10.00
DI-EI	Increases	0.43	0.33	0.62	0.67	0.48	0.34	0.55	0.64	0.91	0.51	0.57
	Initiations	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
DNC-ED		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DNC-EI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

When the record of percentage changes in dividend for mid-year and year-end subsamples were examined separately (Panels B and C of Table 4-3), the patterns observed did not appear markedly different from each other — with the caveat that the dividend increase categories, DI-EI and DI-ED increased six and eight percentage points at the year-end over the mid-year figures. Further, while the DD-ED mean percentages remained pretty constant, the DD-EI average rose eight points from -39 percent in the mid-year to a year-end level of -31 percent. In other words, dividend reductions tended to be more muted at the end of the company year than at its midway point.

However, when these trends were subjected to a Kruskal-Wallis test, the result revealed, with one exception, no significant differences (at the five percent level of a Type 1 error) in the magnitude of either dividend or percentage change in dividend. The exception was the DI-ED category after observations of dividend initiations and resumptions had been deleted ($\chi^2 = 7.7831$, $Pr > \chi^2 = 0.0053$) which left 42 year-end and only 22 mid-year observations for the procedure. Nevertheless, the possibility of a differential in investor reaction to the two announcements timings is not ruled out by this lacking of a significant quantitative difference. Kahneman and Tversky (1979 and 1984) demonstrated that financial decision makers are strongly influenced by the context in which information is presented to them,[146] and there may well be a contextual distinction between mid-year and year-end announcements.

Figure 4-1 shows the dispersion of ΔDPS in percentages over time. There is no evidence of any dramatic changes in the decade. The large clumping of observations at zero is merely indicative of the large number of DNC (no change in dividend) observations in the sample. The proportion of DNC observations (35.5 percent) is just over one third of all observations available to the study. This is certainly indicative of a preference for a fixed dividend policy.

Figure 4-1: Dispersion of ΔDPS over Time.



4.4 Characteristics of Earnings per Share

The equivalent tabulation of earnings information is provided in Table 4-4. Given that the EPS figures released in mid-year announcements only cover profits generated during the first half of the company year, one would expect the year-end average EPS figures reported in the bottom

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[146] Kahneman and Tversky (1979), pp. 263 – 291. Also, Kahneman and Tversky. (1984), pp 341 – 350. A direct application of their work in the discipline of Finance was provided by Shefrin, and Statman (1984.).

rows of Panel C to be close to double those of the mid-year equivalents in Panel B. This is certainly evident from May 1996 onward. However, it does not appear to be the case over the first five years. As mentioned in the previous subsection of this chapter, EPS figures were not explicitly reported in the twice-yearly company announcements to the NZX (as released by the Exchange to the investing public, and archived by IRG Ltd) till 1996. The relative flattening of the mid-year/year-end differential over the first five years may have been a function of the necessarily approximate EPS estimation calculation. In particular, the number of shares outstanding used in mid-year calculations was the figure obtained from the end of the previous company year. This will have had the effect of inflating the mid-year EPS figures relative to the year-end figures. However, since the calculation of mid-year percentage change figures are always calculated with respect to the previous mid-year EPS figure, and the year-end percentage change likewise with respect to the previous year-end EPS on record, this inflation should not be a problem.

Table 4-4: Average of Earnings Per Share (EPS) in Cents from 1990 to 1999.

PANEL A: Full Sample (948 Observations)

DPSEPS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Avg
DD-ED	15.01	7.89	6.24	-0.24	9.10	10.54	3.97	10.90	9.06	9.47	8.19
DD-EI	49.41	9.47	5.83	26.92	18.87	70.03	16.00	36.56	14.25	12.30	24.66
DI-ED	20.40	18.29	5.01	9.72	11.94	25.01	11.40	14.05	10.56	9.74	14.89
DI-EI	16.61	35.52	24.19	26.15	23.22	20.10	21.65	14.06	15.25	15.83	20.60
DNC-ED	7.87	12.91	12.42	13.09	10.58	9.72	15.14	10.87	12.63	12.88	12.21
DNC-EI	21.38	11.44	15.49	16.18	31.61	19.47	11.76	14.73	13.80	16.06	16.48
Overall average	15.05	16.40	16.24	18.22	19.54	18.11	14.35	14.02	12.47	13.29	15.54

PANEL B: Mid-year Subsample (432 Observations)

DPSEPS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Avg
DD-ED	13.42	7.72	2.47	4.50	7.08	9.81	2.03	8.52	3.26	4.55	5.65
DD-EI		5.43	5.83	6.57	14.19	39.93	18.98	3.72	3.66	4.95	10.79
DI-ED			3.96	3.84		13.56	11.22	10.28	7.58	12.23	11.03
DI-EI	24.56	27.49	16.98	20.89	13.77	12.68	14.44	8.37	13.77	11.24	14.88
DNC-ED	6.45	12.30	8.60	8.40	8.51	7.83	9.01	7.75	6.72	9.58	8.39
DNC-EI		8.24	13.54	11.66	52.09	10.87	7.17	14.53	10.52	9.89	12.87
Overall average	14.30	13.42	11.38	14.06	15.71	11.31	9.81	8.90	8.47	8.96	10.97

PANEL C Year-end Subsample (516 Observations)

DPSEPS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Avg
DD-ED	18.19	7.96	8.93	-2.95	10.44	11.21	5.46	12.93	13.49	12.98	10.10
DD-EI	49.41	11.49		32.01	22.38	100.13	14.51	47.51	17.77	19.65	31.87
DI-ED	20.40	18.29	6.05	10.90	11.94	35.41	11.81	16.32	11.23	8.49	17.20
DI-EI	8.65	42.21	28.44	30.67	31.82	22.97	29.66	19.76	16.30	19.28	24.98
DNC-ED	9.64	13.89	15.29	20.60	13.46	12.66	19.22	13.81	18.54	15.81	16.14
DNC-EI	21.38	15.17	17.22	22.00	21.37	38.80	20.03	14.93	23.65	21.71	20.76
Overall average	15.69	18.87	19.85	21.69	22.49	23.80	18.83	18.46	15.77	16.66	19.37

The average percentage change in EPS figures are provided in Table 4-5. The immediate item of note, with respect to the full sample in Panel A, is that the DI-EI category of announcements is associated with a 240 percent increase in earnings per share while the DD-ED category is associated with an 81 percent drop in EPS. These are the extremes. They will have been amplified by the inclusion of announcement observations in which there were dividend initiations and dividend omissions. Quite clearly, a dividend would be initiated or resumed if the company was achieving and forecasting good profitability; while a dividend would be dropped altogether if actual and foreseen future profits were negative.

Table 4-5: Average Percentage Change in Earnings Per Share from 1990 to 1999.

PANEL A: Full Sample (948 Observations)											
DPSEPS	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**Avg**
DD-ED	-0.25	-0.41	-0.70	-0.99	-0.59	-0.70	-0.93	-0.39	-1.33	-0.78	-0.81
DD-EI	0.26	0.10	0.29	0.34	1.34	0.19	0.52	0.63	0.41	0.42	0.59
DI-ED	-0.04	-0.26	-0.28	-0.17	-0.29	-0.29	-0.52	-0.15	-0.20	-0.68	-0.33
DI-EI	1.09	1.70	5.34	1.57	0.63	2.06	2.76	6.79	0.91	0.93	2.40
DNC-ED	-0.40	-0.17	-0.24	-0.25	-0.30	-0.47	-0.71	-0.29	-0.31	-0.16	-0.38
DNC-EI	0.46	0.47	0.46	0.67	0.25	0.75	0.13	0.45	0.45	0.20	0.42
Overall average	0.23	0.34	2.07	0.65	0.27	0.55	0.40	1.76	-0.10	0.05	0.61
PANEL B: Mid-year Subsample (432 Observations)											
DPSEPS	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**Avg**
DD-ED	-0.17	-0.28	-0.95	-0.75	-0.48	-0.75	-1.37	-0.43	-2.21	-0.52	-1.01
DD-EI		0.12	0.29	0.24	2.51	0.36	0.00	0.96	1.02	0.71	0.99
DI-ED			-0.33	-0.07		-0.39	-0.66	-0.15	-0.29	-0.46	-0.43
DI-EI	0.95	2.31	10.64	1.84	0.69	0.37	4.69	1.36	0.71	0.83	2.31
DNC-ED	-0.28	-0.17	-0.19	-0.26	-0.31	-0.59	-1.33	-0.28	-0.34	-0.11	-0.47
DNC-EI		0.26	0.50	0.41	0.19	0.84	0.12	0.42	0.57	0.26	0.41
Overall average	0.19	0.47	3.61	0.78	0.42	-0.13	0.83	0.31	-0.33	0.15	0.50
PANEL C: Year-end Subsample (516 Observations)											
DPSEPS	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**Avg**
DD-ED	-0.40	-0.47	-0.52	-1.13	-0.66	-0.64	-0.59	-0.35	-0.66	-0.96	-0.66
DD-EI	0.26	0.09		0.37	0.46	0.03	0.78	0.53	0.21	0.12	0.37
DI-ED	-0.04	-0.26	-0.23	-0.19	-0.29	-0.21	-0.22	-0.16	-0.18	-0.79	-0.27
DI-EI	1.23	1.19	2.21	1.34	0.58	2.72	0.61	12.22	1.05	1.00	2.47
DNC-ED	-0.55	-0.18	-0.28	-0.24	-0.28	-0.29	-0.29	-0.31	-0.28	-0.21	-0.29
DNC-EI	0.46	0.72	0.42	1.01	0.29	0.55	0.14	0.47	0.09	0.16	0.42
Overall average	0.27	0.23	0.93	0.54	0.16	1.11	-0.03	3.03	0.09	-0.03	0.70

The DD-EI group in Panel A of Table 4-5 had a much more modest increase in EPS of only 59 percent averaged over the decade, suggesting that dividend-setters in these firms believed that the generated cash flows were perhaps just too small to be diverted from reinvestment to disbursements to investors. Similarly, the DI-ED group had the smallest drop in EPS of all earnings-decreasing categories, at 33 percent. The magnitude of this EPS reduction suggests that the decision to increase the dividend in the face of a decline in earnings was tenable if the decline was relatively muted (and thought to be temporary). There is an element of optimism here. The DI-ED drop of 33 percent in earnings was slightly smaller than the 38 percent drop registered in the DNC-ED observations which may suggest that 33 percent was close to the boundary at which (on average), optimism evaporated, to be replaced by a more cautious conservatism.

Similar patterns are evident with respect to the mid-year and year-end subsamples in Panels B and C. However, a Kuskal-Wallis test for magnitude differences (in percentage change in EPS) between the two announcement timings failed, with one exception, to find any differences significant at the five percent level of error. The exception was provided by the DD-EI category ($\chi^2 = 4.84$, $\Pr > \chi^2 = 0.028$), where the mean percentage increase in earnings from the previous mid-year to the current mid-year was 99 percent; but the corresponding year-end percentage change was only 37 percent.

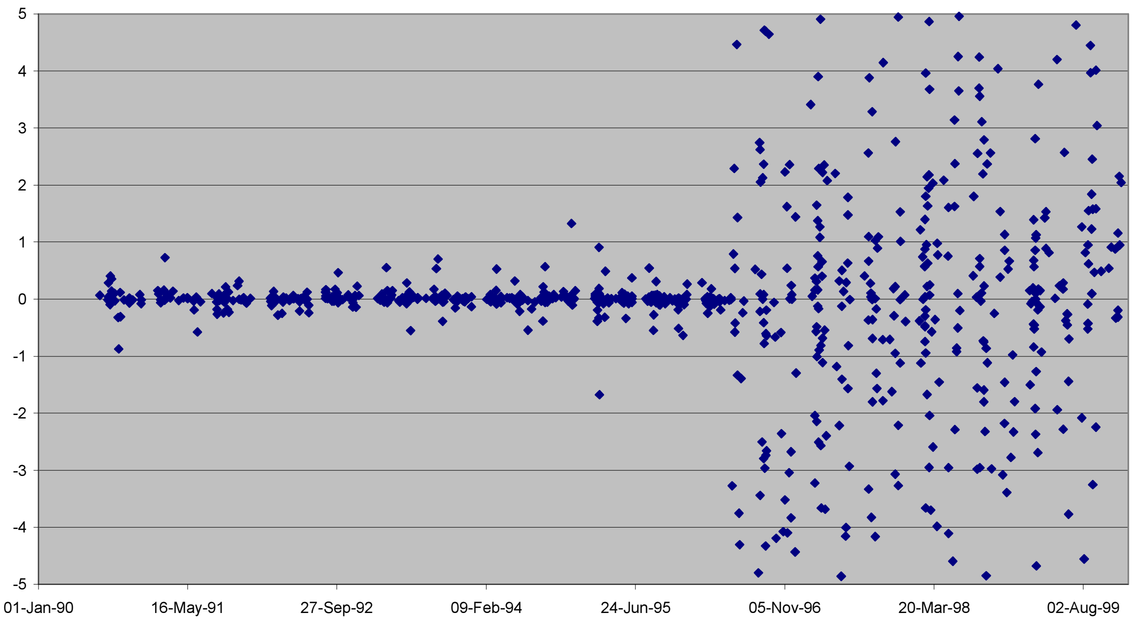
However, this announcement category contained only 38 observations (13 mid-year and 25 year end datapoints) which renders the result a little unreliable. Nevertheless, a failure to find significant differences in percentage earnings change magnitudes does not rule out the possibility of perceptional distinctions in the minds of investors who may well subjectively include a temporal ingredient in the way they subjectively frame announcement information for decision processing.[147]

While the behaviour of the mean changes in EPS does not appear to differ too much between the early part of the decade up till May 8th 1996 and from then until the end of 1999, the dispersion of observed changes most certainly does. The datapoints for ΔEPS are plotted by time in Figure 4-2. It is clear that the EPS approximation used in the first half of the decade produced much more homogeneous results than the published figures available in the second half. These would have taken into account a number of items not available in the announcement disclosure such as the value of options and convertible bonds outstanding.

Because this change in variance may well have a major effect on future computations, separate estimations will be made with respect to each half of the data set. Also a dummy variable regression equivalent of a Chow test is reported in that chapter, in Section 5.5.

[147] We return here to the concepts of decision making under risk, and the concept of framing, discussed by Kahneman and Tversky (1979 and 1984).

Figure 4-2: **ΔEPS plotted by Time.**



The date that the last announcement (in the data set) not containing DPS information was published was May 8th 1996. The date of the first to do so was May 13th 1996. May was the month that the NZX's new disclosure regulations came into force.

The information revealed about dividend and earnings announcements in this chapter has been restricted to a description of the information which will be codified for use as independent variables in the next chapter. So far, nothing has been stated about the nature of the study's chief dependent variable, the one-day AR and the three-day CAR (apart from a description of their construction). In the next chapter, this dependent variable is studied in depth; and Restricted Least Squares regressions are employed to determine whether there is indeed an investor reaction to a joint dividend-and-earnings message — and if so, cast light on its quantitative nature.

5 Market Model-based Results

5.1 Chapter Introduction

As discussed in the methods and data chapter, the number of announcement observations available for use was 948. I intend now to show how these announcement events have impacted on share prices in terms of ARs and CARs generated over the twenty-one days of the test period, including the announcement date (t_0). Narrowly speaking, t_0 is the point in time that is of particular note, the actual event day. There is no absolute reason for restricting the event window to just that one day. In the current study, the publication of the joint dividends and earning announcement by the New Zealand Stock Exchange on day t is used as the official point of release; and, as this information does not necessarily reach all interested investors directly or on the same day, day t_1 is included in the event window. Further, day t_{-1} is also included on the ground that there may be some information leakage from the company between its dividend decision and the New Zealand Stock Exchange's release of it.

Just one day is possibly too restricted a span in which to register the immediate impact of an information disclosure which has to be picked up by market participants and acted upon via their brokers (if they are small investors) or the finance departments of larger investors. Lonie, Abeyratna, Power and Sinclair (1996) designated days t_0 and t_{-1} jointly as the announcement period on the ground that dividend information may have been disclosed to the market one day before its publication in the financial press (in their case, London's Financial Times). They noted that if the "information-content hypothesis is correct and the stock market is efficient, the two-day CAR should be significantly different from zero."[148] By contrast, Pettit (1972) found significant ARs on days t_0 and t_1. Therefore, in this chapter, the emphasis is going to be on a three-day event window (t_{-1}, t_0, t_1.)

The results in the chapter are laid out in a pattern which is established with respect to the *t*-testing of ARs and CARs in Sections 5.2 and 5.3, and which is repeated with respect to Restricted Least Squares regressions in Section 5.4. The pattern will not be repeated exhaustively; but should be sufficiently discernible to provide a sense of structure. In full, it starts with scrutiny of the sample as an undistinguished whole, and moves on to examining the apparent effect of the impact of the dividend component of the announcement (ignoring earnings-related confounding effects) and, separately, the apparent influence of the earnings component (ignoring the existence of the dividend component). Then the pattern entails

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[148] Lonie, Abeyratna, Power and Sinclair (1996), p. 35.

investigating the sample in terms of all six dividend-and-earnings categories to reveal the full, systematic effect on ARs and CARs of the putative interaction in investors' minds between the earnings and dividend components published in joint announcements.

In Section 5.2, I will present a picture of one-day ARs. An observation of these will quickly establish the existence of markedly different market responses with respect to whether an increase or decrease in dividends has been announced, or whether announced earnings have gone up or gone down. It will be noted that announcements of dividend initiations (defined loosely as the payment of the dividend where no dividend occurred previously)[149] and dividend omissions are statistically distinguishable from the more general dividend increases and dividend decreases, of which they are subsets.

In Section 5.3, the record of *t*-test results for three-day CARs is covered in accordance with the study's selection of a three-day event window. The purpose is to show that event window CARs differ in the significance of their *t*-test results from the pattern exhibited by their neighbours.

In Section 5.4 the regression results, concerning three-day CARs are presented. This section starts with simple regressions concerning the variables, percentage change in earnings from that announced in the previous announcement (of the same type) ΔEPS and percentage change in dividend from the dividend announced at the equivalent time last year, ΔDPS. Then dummy variables are developed for earnings changes (alone), and then for dividend changes (alone); and the section culminates in a restricted least squares procedure (RLS) accounting for the first-order variables and all six relevant earnings-and-dividend combinations. Then in Section 5.5 a small experiment is conducted with respect to the compilation of EPS data and how it affects the RLS regression results in general while Section 5.7 is a brief wind-up.

5.2 The Patterns Discernible in Abnormal Returns (ARs)

A reasonable place to start is with an analysis of the behaviour of daily abnormal returns (ARs) generated by the full sample. This is shown in terms of daily AR means in Table 5-1, which also contains maxima, minima, standard deviation and *t*-test information for each day. The accompanying figure, Figure 5-1, is a plot of the means; and where there is a mean that is significantly different from zero, it is circled. This is the first of seven such table and graph pairs in this section, all of which employ a common scale from negative 2 percent to positive 2 percent, allowing for direct visual comparisons.

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[149] This definition includes dividend resumptions, including resumptions following as little as one year of no dividend being announced.

When all of the announcement events are considered collectively in Table 5-1 and Figure 5-1, there is no market reaction to dividend and earnings announcements apparent in this sample. The plotted means form virtually a flat line. There is, however, a statistically significant negative AR on the third day after the announcement date, which can be dismissed as random.

When the sample is partitioned into dividend categories (in the meantime completely ignoring the existence of movements in the earnings component), a definite pattern emerges. Panel A of Table 5-2 and the prominent upward spike in Figure 5-2 show that announcements of dividend increases, irrespective of the earnings joint component, furnished significant positive ARs on every day of the event window (days t_{-1}, t_0 and t_1). These peak on the announcement day with a mean of 1.33 percent with a t-value of 4.98 and associated error of less than one ten-thousandth of a percent. The AR for day t_{-1} is not quite so spectacular, but still has an associated error of less than one percent. A small fly in the ointment is a small positive AR significant at the five percent level on day t_{-5}, for which there is no immediate explanation — although concerns about insider trading on the New Zealand market will be considered in Appendix H. Nevertheless, the day zero result here allows us to reject, with respect to DI category AR observations, the null hypothesis repeated here for convenience:

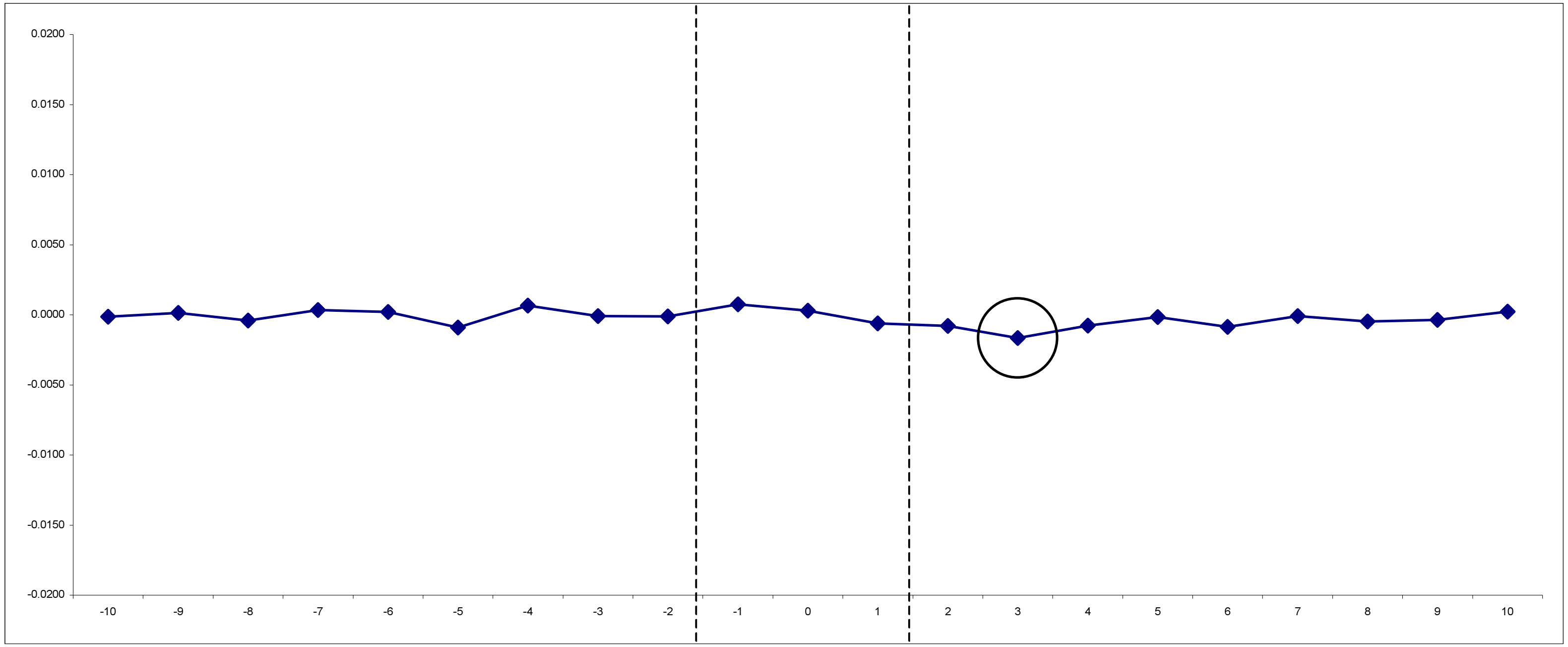
> H_{01}: The abnormal returns generated on the day of the announcement and grouped by direction of change of dividend and direction of change in earnings category will be indistinguishable from zero.

Similarly, when all announcements containing dividend reductions (irrespective of the earnings joint component) are considered together in Panel B of Table 5-2, a strongly significant negative AR of 1.76 percent occurs at the announcement date (t-value = 3.86 with a 0.0002 error), which is represented by the strong downward spike in Figure 5-2. Again there is an AR, significant this time with less than a one percent error, on day t_{-5}. The sign of its mean is negative. These results are similar to those found by Kane, Lee and Marcus (1984), Easton (1991) and Abeyratna (1994). Again we can reject the null hypothesis that DD category ARs are not significantly different from zero in value on the day of the announcement.

Table 5-1: Abnormal Returns over the Test period - Full Sample (Bold type indicates significant at the 5% level of error).

Day	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Count	948	948	948	948	948	948	948	948	948	948	948	948	948	948	948	948	948	948	948	948	948
Min	-0.2024	-0.1340	-0.1392	-0.0609	-0.2191	-0.3022	-0.1844	-0.2420	-0.1065	-0.1906	-0.4674	-0.2410	-0.1735	-0.2362	-0.1405	-0.1009	-0.1486	-0.1534	-0.2046	-0.1182	-0.2116
Max	0.2861	0.2339	0.1121	0.1303	0.1250	0.1206	0.2111	0.1205	0.1488	0.1864	0.3594	0.2449	0.2761	0.1100	0.1995	0.1229	0.1641	0.2543	0.1555	0.2189	0.1724
Mean	-0.0001	0.0001	-0.0004	0.0003	0.0002	-0.0009	0.0006	-0.0001	-0.0001	0.0008	0.0003	-0.0006	-0.0008	-0.0017	-0.0008	-0.0002	-0.0009	-0.0001	-0.0005	-0.0004	0.0002
+ve/-ve	0.9036	1.0170	0.9152	0.9506	0.9466	0.9466	0.8810	0.9466	0.8960	1.0213	1.0000	0.9426	0.8772	0.8960	0.8625	0.9036	0.9036	0.9036	0.9152	0.9791	0.9874
St Dev	0.0225	0.0221	0.0203	0.0188	0.0199	0.0232	0.0215	0.0204	0.0199	0.0229	0.0535	0.0360	0.0278	0.0233	0.0232	0.0201	0.0223	0.0237	0.0212	0.0222	0.0207
t-test	-0.1910	0.1766	-0.6268	0.5553	0.3028	-1.2181	0.9290	-0.1207	-0.1711	1.0204	0.1655	-0.5293	-0.8885	**-2.1970**	-1.0375	-0.2521	-1.1861	-0.1185	-0.6997	-0.5136	0.3308
p-value	0.8486	0.8599	0.5309	0.5788	0.7621	0.2235	0.3531	0.9040	0.8642	0.3078	0.8686	0.5967	0.3745	**0.0283**	0.2998	0.8010	0.2359	0.9057	0.4843	0.6077	0.7408

Figure 5-1: Mean Abnormal Returns over the Test Period.

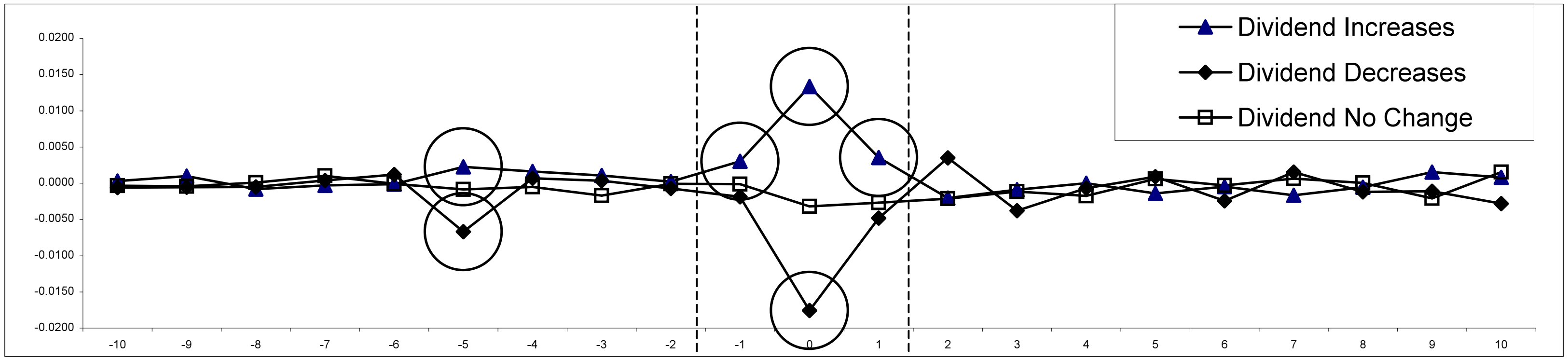


Circled means are significantly different from zero at the 5% level of error.

Table 5-2: Abnormal Returns over the Test Period - Dividend Increases, Dividend Decreases, Dividend No Change.

Day	-10	-90	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Panel A	**DI**																				
Count	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391
Min	-0.2024	-0.0679	-0.1392	-0.0536	-0.0593	-0.0781	-0.0594	-0.2420	-0.0693	-0.0600	-0.4674	-0.1486	-0.1430	-0.0905	-0.0950	-0.1009	-0.1486	-0.1507	-0.0876	-0.1144	-0.0657
Max	0.1693	0.2339	0.1121	0.1303	0.0708	0.1206	0.0919	0.1141	0.1037	0.1238	0.3594	0.1632	0.2077	0.0998	0.1995	0.0954	0.1369	0.1248	0.0913	0.2189	0.0769
Mean	0.0003	0.0010	-0.0008	-0.0003	-0.0001	0.0023	0.0016	0.0011	0.0002	0.0030	0.0133	0.0035	-0.0021	-0.0009	0.0000	-0.0014	-0.0005	-0.0016	-0.0005	0.0015	0.0008
+ve/-ve	1.0051	0.9453	0.8443	0.8443	0.8889	1.1366	0.8186	0.9261	0.8186	1.1250	1.4747	1.1366	0.7773	0.8271	0.8018	0.8018	0.9073	0.8018	0.8981	1.0155	0.9648
St Dev	0.0226	0.0256	0.0199	0.0182	0.0164	0.0200	0.0172	0.0215	0.0179	0.0197	0.0529	0.0320	0.0253	0.0200	0.0228	0.0182	0.0201	0.0207	0.0183	0.0222	0.0153
t-test	0.2464	0.7689	-0.7831	-0.3084	-0.1310	2.2437	1.8635	0.9831	0.2370	3.0440	4.9808	2.1883	-1.6088	-0.8685	-0.0033	-1.5204	-0.4692	-1.5744	-0.5890	1.3632	1.0271
p-value	0.8055	0.4424	0.4341	0.7579	0.8959	**0.0254**	0.0631	0.3262	0.8128	**0.0025**	**0.0000**	**0.0292**	0.1085	0.3856	0.9974	0.1292	0.6392	0.1162	0.5562	0.1736	0.3050
Panel B	**DD**																				
Count	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
Min	-0.1303	-0.1340	-0.0903	-0.0609	-0.0920	-0.3022	-0.1844	-0.0567	-0.0880	-0.1906	-0.4088	-0.2410	-0.1630	-0.2362	-0.1405	-0.0883	-0.1353	-0.1534	-0.2046	-0.1160	-0.2116
Max	0.2861	0.0806	0.0822	0.1288	0.1184	0.0768	0.2111	0.1035	0.1488	0.1864	0.1547	0.2204	0.2761	0.1100	0.1296	0.1229	0.0863	0.1417	0.1555	0.1195	0.1724
Mean	-0.0006	-0.0006	-0.0005	0.0004	0.0012	-0.0067	0.0007	0.0004	-0.0007	-0.0019	-0.0176	-0.0048	0.0035	-0.0038	-0.0007	0.0009	-0.0024	0.0015	-0.0012	-0.0011	-0.0028
+ve/-ve	0.7460	1.2222	1.0000	1.0370	1.0561	0.7742	1.0755	1.0755	1.0370	0.9298	0.6541	0.7886	1.1359	0.9469	1.0755	0.9820	1.1359	1.1782	1.0561	1.0952	0.9643
St Dev	0.0302	0.0233	0.0227	0.0227	0.0233	0.0342	0.0291	0.0204	0.0243	0.0315	0.0675	0.0468	0.0364	0.0348	0.0284	0.0261	0.0255	0.0279	0.0305	0.0247	0.0296
t-test	-0.2910	-0.3564	-0.3278	0.2400	0.7484	-2.9020	0.3455	0.2559	-0.4547	-0.8852	-3.8582	-1.5326	1.4245	-1.6245	-0.3634	0.5075	-1.4078	0.8247	-0.5772	-0.6749	-1.4147
p-value	0.7713	0.7219	0.7434	0.8105	0.4550	**0.0041**	0.7300	0.7982	0.6497	0.3770	**0.0002**	0.1268	0.1557	0.1057	0.7167	0.6123	0.1606	0.4104	0.5644	0.5005	0.1586
Panel C	**DNC**																				
Count	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337
Min	-0.0692	-0.0616	-0.1230	-0.0602	-0.2191	-0.0787	-0.0782	-0.0833	-0.1065	-0.0779	-0.2023	-0.1536	-0.1735	-0.0627	-0.1362	-0.0668	-0.0678	-0.1300	-0.0945	-0.1182	-0.1010
Max	0.0590	0.0922	0.0699	0.0889	0.1250	0.0584	0.1565	0.1205	0.0942	0.1151	0.1787	0.2449	0.1494	0.0591	0.0535	0.0902	0.1641	0.2543	0.0893	0.0702	0.0876
Mean	-0.0003	-0.0004	0.0001	0.0010	-0.0001	-0.0008	-0.0005	-0.0017	-0.0001	-0.0001	-0.0032	-0.0027	-0.0022	-0.0012	-0.0017	0.0006	-0.0003	0.0006	0.0001	-0.0021	0.0015
+ve/-ve	0.9040	0.9824	0.9480	1.0301	0.9480	0.8722	0.8415	0.8933	0.9040	0.9708	0.8415	0.8516	0.8516	0.9480	0.8118	0.9824	0.7737	0.8722	0.8516	0.8722	1.0301
St Dev	0.0154	0.0162	0.0191	0.0167	0.0211	0.0159	0.0202	0.0191	0.0188	0.0193	0.0378	0.0315	0.0237	0.0165	0.0196	0.0174	0.0226	0.0240	0.0165	0.0202	0.0188
t-test	-0.3972	-0.4892	0.0780	1.1447	-0.0810	-0.9756	-0.4514	-1.6296	-0.0724	-0.1405	-1.5571	-1.5652	-1.6676	-1.3004	-1.6317	0.6071	-0.2317	0.4942	0.0564	-1.8919	1.5112
p-value	0.6915	0.6250	0.9379	0.2532	0.9355	0.3300	0.6520	0.1041	0.9424	0.8884	0.1204	0.1185	0.0963	0.1943	0.1037	0.5442	0.8169	0.6215	0.9550	0.0594	0.1317

Figure 5-2: Mean Values of Abnormal Returns over the Test Period - Dividend Increases, Dividend Decreases, Dividend No Change.



Circled means are significantly different from zero at the 5% level of error.

However, when the data set was filtered to observe the market reaction to announcements in which dividends were left unchanged (irrespective of the earnings joint component), no significant ARs were found anywhere in the 21-day window spanning the announcement date. This pattern of insignificant results can be read across the bottom row of Panel C of Table 5-2. Again this pattern of results was similar to what Easton (1991) found on Australian data and Abeyratna (1994) found on his UK data. In this instance, the null hypothesis that DNC category ARs are indistinguishable from zero cannot be rejected.

Next, the sample was partitioned by the nature of the announcements' earnings components. With respect to the subsample containing all announcements of earnings increases and tabulated in Panel A of Table 5-3, there was a strongly significant one percent AR (t-value = 4.34, $p < 0.0000$) on the day of the announcement. The previous day (t_{-1}) furnished a much smaller positive AR that was weakly significant at the 7 percent level of error; but it was day t_2 that produced the most interesting output. This was a negative AR significant at less than the one percent level of error. A further negative correction significant at the five percent level of error occurred on day t_7. Further, in accordance with the premature fluctuation noted roughly a working week in advance of announcements of dividend increases and decreases (Table 5-2 and Figure 5-2), a small positive AR significant at the 5% level of error was detected on day t_{-4}.

We now turn to observations of earnings decreases only (irrespective of their dividend joint component). The subsample of all earnings decrease announcements generated a negative one percent AR with a negligible associated error on the announcement day, t_0, while the following day (t_1) furnished only a weakly significant negative AR. However, there was a further negative AR significant within a five percent level of error on day t_3. It was interesting that from day t_2 onward, the largely insignificant ARs fluctuate in sign, whereas those for the week leading up to the announcement date are uniformly negative. Of these, the AR for day t_{-5} is significant within the five percent level of error.

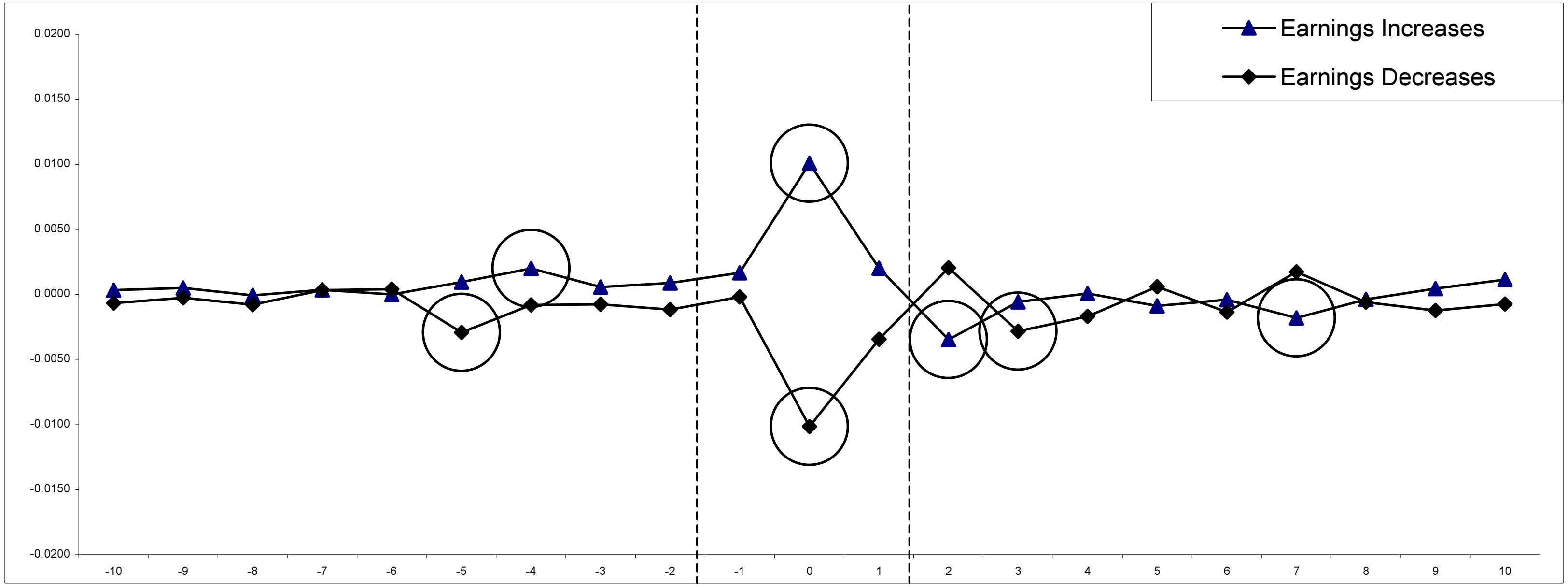
These earnings-related results show that (when dividend information is ignored), a significantly positive AR is generated on day t_0 when announced earnings rise, which is replaced by a significantly negative AR when announced earnings fall. This enables us to reject the null hypothesis, H_{01} with respect to both EI and ED category ARs.

The earnings results and the dividend results together behave in a similar but not identical manner to that detected by Easton and Sinclair (1989) on Australian data. They found that controlling for a dividend effect on joint announcement data allowed a significant earnings effect to be seen. When they controlled for earnings there was a much reduced dividend effect.

Table 5-3: Abnormal Returns over the Test Period - Earnings Change ignoring Dividend Change.

Day	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Panel A	**EI**																				
Count	489	489	489	489	489	489	489	489	489	489	489	489	489	489	489	489	489	489	489	489	489
Min	-0.2024	-0.1340	-0.1392	-0.0536	-0.2191	-0.0719	-0.0782	-0.2420	-0.0693	-0.0715	-0.4674	-0.1486	-0.1576	-0.0905	-0.0594	-0.0731	-0.1486	-0.1507	-0.0876	-0.1182	-0.0911
Max	0.1693	0.2339	0.1121	0.1303	0.1250	0.1206	0.2111	0.1205	0.1488	0.1238	0.3594	0.2449	0.2077	0.0998	0.1995	0.0954	0.1641	0.1248	0.1055	0.2189	0.0769
Mean	0.0003	0.0005	-0.0001	0.0004	0.0000	0.0010	0.0020	0.0006	0.0009	0.0017	0.0101	0.0020	-0.0035	-0.0006	0.0001	-0.0009	-0.0004	-0.0018	-0.0004	0.0004	0.0011
+ve/-ve	0.9718	0.8953	0.8808	1.0041	0.8808	1.0041	0.8736	0.9405	0.8664	1.0207	1.2227	0.9482	0.7098	0.8593	0.7978	0.8111	0.8315	0.7978	0.8736	0.9718	0.9878
St Dev	0.0211	0.0250	0.0202	0.0176	0.0208	0.0194	0.0220	0.0218	0.0188	0.0204	0.0514	0.0326	0.0258	0.0192	0.0211	0.0188	0.0211	0.0200	0.0191	0.0230	0.0169
t-test	0.3619	0.4336	-0.0801	0.4407	-0.0070	1.0948	2.0199	0.5766	1.0396	1.7951	4.3376	1.3756	-2.9743	-0.6494	0.0642	-1.0308	-0.4140	-2.0056	-0.4275	0.4287	1.4807
p-value	0.7176	0.6648	0.9362	0.6596	0.9944	0.2741	0.0439	0.5645	0.2991	0.0733	**0.0000**	0.1696	**0.0031**	0.5164	0.9489	0.3031	0.6791	0.0454	0.6692	0.6684	0.1393
Panel B	**ED**																				
Count	459	459	459	459	459	459	459	459	459	459	459	459	459	459	459	459	459	459	459	459	459
Min	-0.1303	-0.1044	-0.1230	-0.0609	-0.0920	-0.3022	-0.1844	-0.0833	-0.1065	-0.1906	-0.4088	-0.2410	-0.1735	-0.2362	-0.1405	-0.1009	-0.1353	-0.1534	-0.2046	-0.1160	-0.2116
Max	0.2861	0.0922	0.0786	0.1288	0.1184	0.0768	0.1179	0.1035	0.0942	0.1864	0.1547	0.2204	0.2761	0.1100	0.1296	0.1229	0.1572	0.2543	0.1555	0.1195	0.1724
Mean	-0.0007	-0.0003	-0.0008	0.0003	0.0004	-0.0029	-0.0008	-0.0008	-0.0012	-0.0002	-0.0102	-0.0034	0.0020	-0.0028	-0.0017	0.0006	-0.0014	0.0017	-0.0006	-0.0012	-0.0007
+ve/-ve	0.8360	1.1651	0.9532	0.8967	1.0220	0.8889	0.8889	0.9532	0.9286	1.0220	0.8071	0.9367	1.0959	0.9367	0.9367	1.0132	0.9870	1.0310	0.9615	0.9870	0.9870
St Dev	0.0239	0.0185	0.0204	0.0201	0.0189	0.0265	0.0210	0.0188	0.0209	0.0253	0.0537	0.0391	0.0296	0.0269	0.0252	0.0213	0.0236	0.0270	0.0233	0.0212	0.0241
t-test	-0.5868	-0.3022	-0.8156	0.3497	0.4656	-2.3574	-0.8147	-0.8807	-1.2031	-0.1689	-4.0504	-1.8851	1.4773	-2.2508	-1.4252	0.5994	-1.2327	1.3788	-0.5544	-1.2488	-0.6627
p-value	0.5576	0.7627	0.4152	0.7267	0.6417	0.0188	0.4157	0.3789	0.2295	0.8660	**0.0001**	0.0601	0.1403	**0.0249**	0.1548	0.5492	0.2183	0.1686	0.5796	0.2124	0.5078

Figure 5-3: Mean values of Abnormal returns over the Test period - Earnings Change ignoring Dividend Change.

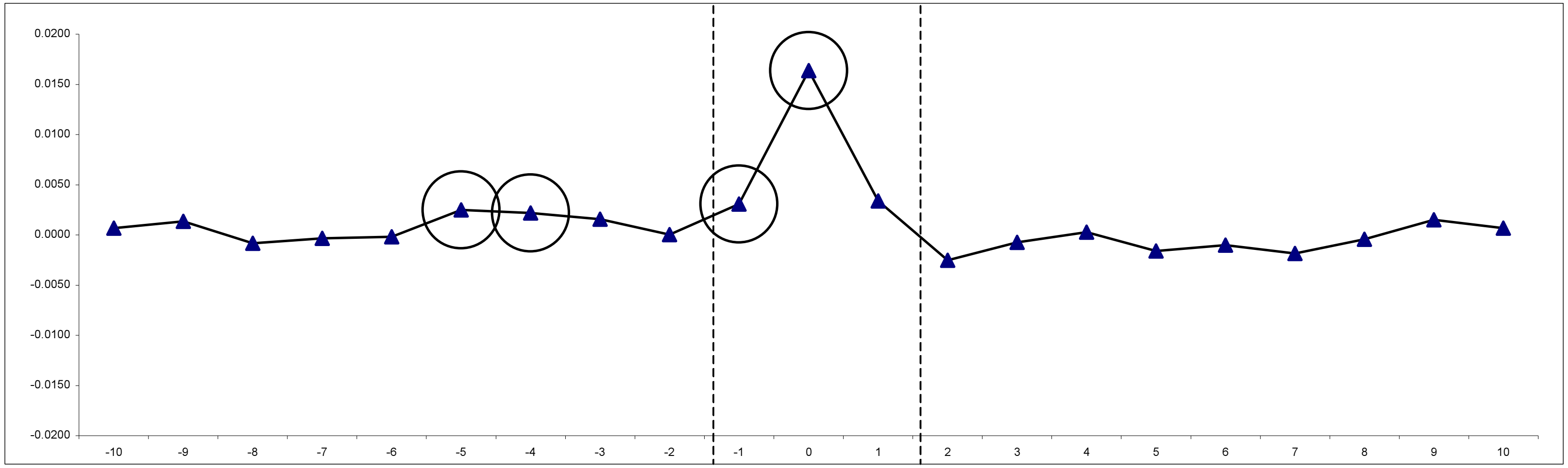


Circled means are significantly different from zero at the 5% level of error.

Table 5-4: Abnormal Returns for DI-EI Announcements over the Test Period and Event Window.

Day	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Panel A	Di-EI Announcements - Full Sample																				
Count	311	311	311	311	311	311	311	311	311	311	311	311	311	311	311	311	311	311	311	311	311
Min	-0.2024	-0.0679	-0.1392	-0.0536	-0.0593	-0.0719	-0.0594	-0.2420	-0.0693	-0.0528	-0.4674	-0.1486	-0.1430	-0.0905	-0.0594	-0.0593	-0.1486	-0.1507	-0.0876	-0.1144	-0.0657
Max	0.1693	0.2339	0.1121	0.1303	0.0708	0.1206	0.0919	0.1141	0.1037	0.1238	0.3594	0.1632	0.2077	0.0998	0.1995	0.0954	0.1369	0.1248	0.0913	0.2189	0.0769
Mean	0.0007	0.0014	-0.0008	-0.0003	-0.0002	0.0025	0.0022	0.0016	0.0000	0.0031	0.0164	0.0034	-0.0025	-0.0007	0.0003	-0.0016	-0.0010	-0.0018	-0.0004	0.0015	0.0007
+ve/-ve	1.0195	0.9198	0.8081	0.8512	0.8294	1.1301	0.8735	0.9438	0.7874	1.0872	1.5492	1.0872	0.7278	0.8081	0.7977	0.7374	0.8512	0.7977	0.8963	1.0596	0.9438
St Dev	0.0232	0.0276	0.0200	0.0190	0.0173	0.0207	0.0185	0.0231	0.0182	0.0203	0.0565	0.0331	0.0268	0.0195	0.0231	0.0178	0.0210	0.0213	0.0189	0.0232	0.0152
t-test	0.5128	0.8668	-0.7362	-0.3037	-0.1799	2.1249	2.0929	1.1890	0.0162	2.6719	5.1096	1.8097	-1.6653	-0.6571	0.2118	-1.5794	-0.8523	-1.5197	-0.4022	1.1368	0.8051
p-value	0.6084	0.3867	0.4621	0.7616	0.8573	**0.0344**	**0.0372**	0.2353	0.9871	**0.0079**	**0.0000**	0.0713	0.0969	0.5116	0.8324	0.1153	0.3947	0.1296	0.6878	0.2565	0.4214
Panel B	Di-EI Announcements -Initiations and Resumptions Only																				
Count	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Min	-0.0724	-0.0459	-0.1392	-0.0536	-0.0528	-0.0515	-0.0430	-0.0581	-0.0693	-0.0253	-0.0597	-0.1486	-0.1430	-0.0583	-0.0553	-0.0593	-0.1486	-0.1507	-0.0876	-0.0613	-0.0321
Max	0.1693	0.2252	0.1121	0.0565	0.0394	0.1206	0.0614	0.0638	0.0496	0.0665	0.2888	0.1632	0.0547	0.0998	0.1600	0.0954	0.0520	0.0571	0.0655	0.0763	0.0704
Mean	0.0025	0.0037	-0.0036	0.0015	-0.0006	0.0045	0.0017	0.0013	-0.0010	0.0077	0.0212	0.0006	-0.0111	-0.0018	0.0021	-0.0021	-0.0093	-0.0051	-0.0012	0.0009	0.0023
+ve/-ve	0.9143	0.6750	0.4255	1.0303	0.6341	0.8611	0.6750	0.8108	0.5952	1.3929	1.0938	0.9143	0.4889	0.5581	0.7179	0.5952	0.4255	0.6341	0.6750	0.9143	0.9706
St Dev	0.0303	0.0390	0.0281	0.0213	0.0166	0.0289	0.0200	0.0218	0.0192	0.0184	0.0584	0.0476	0.0332	0.0250	0.0266	0.0252	0.0277	0.0268	0.0236	0.0201	0.0165
t-test	0.6801	0.7685	-1.0419	0.5660	-0.3172	1.2819	0.7013	0.4801	-0.4189	3.4193	2.9638	0.0975	-2.7217	-0.5997	0.6559	-0.6776	-2.7594	-1.5645	-0.4217	0.3557	1.1314
p-value	0.4988	0.4449	0.3012	0.5733	0.7521	0.2044	0.4856	0.6327	0.6767	0.0011	**0.0042**	0.9226	**0.0083**	0.5507	0.5141	0.5004	**0.0075**	0.1225	0.6746	0.7232	0.2620
Panel C	Di-EI Announcements -Without Initiations and resumptions																				
Count	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244	244
Min	-0.2024	-0.0679	-0.0957	-0.0528	-0.0593	-0.0719	-0.0594	-0.2420	-0.0647	-0.0528	-0.4674	-0.0809	-0.0506	-0.0905	-0.0594	-0.0560	-0.0584	-0.0834	-0.0544	-0.1144	-0.0657
Max	0.0789	0.2339	0.0851	0.1303	0.0708	0.0840	0.0919	0.1141	0.1037	0.1238	0.3594	0.1450	0.2077	0.0807	0.1995	0.0482	0.1369	0.1248	0.0913	0.2189	0.0769
Mean	0.0002	0.0007	-0.0001	-0.0008	0.0000	0.0019	0.0023	0.0016	0.0003	0.0018	0.0150	0.0042	-0.0002	-0.0004	-0.0002	-0.0015	0.0013	-0.0009	-0.0002	0.0017	0.0003
+ve/-ve	1.0504	1.0000	0.9520	0.8074	0.8915	1.2182	0.9365	0.9837	0.8485	1.0165	1.7111	1.1404	0.8074	0.8915	0.8209	0.7810	1.0165	0.8485	0.9677	1.1034	0.9365
St Dev	0.0208	0.0236	0.0171	0.0183	0.0175	0.0179	0.0180	0.0234	0.0180	0.0207	0.0560	0.0280	0.0243	0.0177	0.0222	0.0153	0.0181	0.0195	0.0174	0.0240	0.0148
t-test	0.1256	0.4792	-0.0741	-0.7007	-0.0429	1.6952	2.0089	1.0868	0.2525	1.3726	4.1988	2.3346	-0.1211	-0.3720	-0.1622	-1.4961	1.0987	-0.7487	-0.1927	1.0838	0.2692
p-value	0.9002	0.6322	0.9410	0.4842	0.9658	0.0913	**0.0457**	0.2782	0.8008	0.1711	**0.0000**	**0.0204**	0.9037	0.7102	0.8713	0.1359	0.2730	0.4548	0.8474	0.2795	0.7880

Figure 5-4: Mean Values of Abnormal Returns over the Test Period - DI-EI Full Sample (Panel A) Only.



Circled means are significantly different from zero at the 5% level of error.

The pattern of dividend and earnings effects becomes even clearer when the interactions of joint earnings and dividend announcements are explicitly taken into account. Of these, the DI-EI and DD-ED combinations should produce the starkest impact on the behaviour of ARs, as they contain pairings that pull in the same as distinct from opposing directions. With respect to the two DNC combinations, one would expect the dividend to have little influence on investors, but for there to be some influence emanating from the rise or fall in earnings which would be somewhat muted down by the 'DNC' aspect. With respect to the DD-EI and DI-ED combinations, the component changes pull in opposite directions. In these cases, one would expect that the impact on ARs would be minimised by the canceling effect of the two countervailing influences.

I will start with the DI-EI permutation in Table 5-4. All DI-EI announcements, including those announcing resumptions of dividends and initiations of dividends for the first time, are considered in Panel A. Two of the three days in the event window produce strongly significant ARs. The positive mean AR of 0.31 percent (t-value = 2.67, p = 0.0079) on day t_{-1}, is followed on the announcement day, t_0 by a positive 1.64 percent mean AR (t-value = 5.11, p < 0.0001). There is a further, but only weakly significant AR (at the 7 percent level of error) on day t_1. It is to be noted that the apparently premature week-earlier phenomenon (noted in this discussion of Table 5-2 and Table 5-3) recurs here. On days t_{-5} and t_{-4}, much smaller positive ARs are recorded within a five percent probability of error. The plot of means for all DI-EI observations from Panel A is shown in Figure 5-4.

In Panel B of Table 5-4, the DI-EI data subsample is filtered so that it contains only dividend initiations and dividend resumptions, of which there are 67 observations. With the subsample thus restricted, the mean magnitude of the announcement day (t_0) AR jumps to 2.12 percent t-value = 2.96, p = 0.0042), while the AR of day t_{-1}, with a similar level of error (t-value = 3.42, p = 0.0011), doubles in size to 0.77 percent. However, there is no apparent leakage of information in advance in Panel B. Instead, there are statistically significant negative corrections on days t_2 (t-value = -2.72, p = 0.0083) and t_6. (t-value = -2.75, p = 0.0075).[150]

Panel C of Table 5-4 contains the AR results on DI-EI announcements once all dividend initiations and resumptions have been excluded from the data set. The magnitude of the AR on the announcement day reduces to 1.50 percent (t-value = 4.20, p < 0.0001), which is still quite a

[150] Panel B and Panel C information is similar in basic shape to that in Panel A and can be easily visualized. But it has not been plotted in Figure Four in order that the picture would remain clear and uncluttered.

strong positive result. This is backed up with a smaller AR of 0.42 percent (t-value = 2.33, $p = 0.0204$), the next day, t_1. With respect to DI-EI announcements in which the DI component consists only of increases upon the dividend of the previous period, it is interesting that the negative correction phenomenon apparent in Panel B has disappeared. Also of interest is that the day preceding the announcement (i.e., day t_{-1}) no longer furnishes a significant result. But the week-in-advance phenomenon recurs with a weakly significant AR on day t_{-4}.

The conclusion to be drawn from panels A, B and C of Table 5-4 is as follows. When earnings changes are kept constant at EI, both dividend initiations and resumptions, and mere increases upon existing dividends produce statistically significant positive ARs in the event window that stick up like a mountain peak from the test period plain. Clearly, H_{01} with respect to the DI-EI category of ARs can confidently be rejected. This result corroborates Emanuel (1984) who found a positive announcement AR for DI-EI announcements on 1970s New Zealand weekly share-returns data.

The initiation and resumption subset produces larger and more strongly significant ARs. This is unsurprising when one considers that a dividend initiation is an infinite percentage increase on the previous period's dividend, which had a value of zero. Investors would seem to react more enthusiastically to the advent of a new or restored dividend than to an amendment to an existing tradition of dividends.

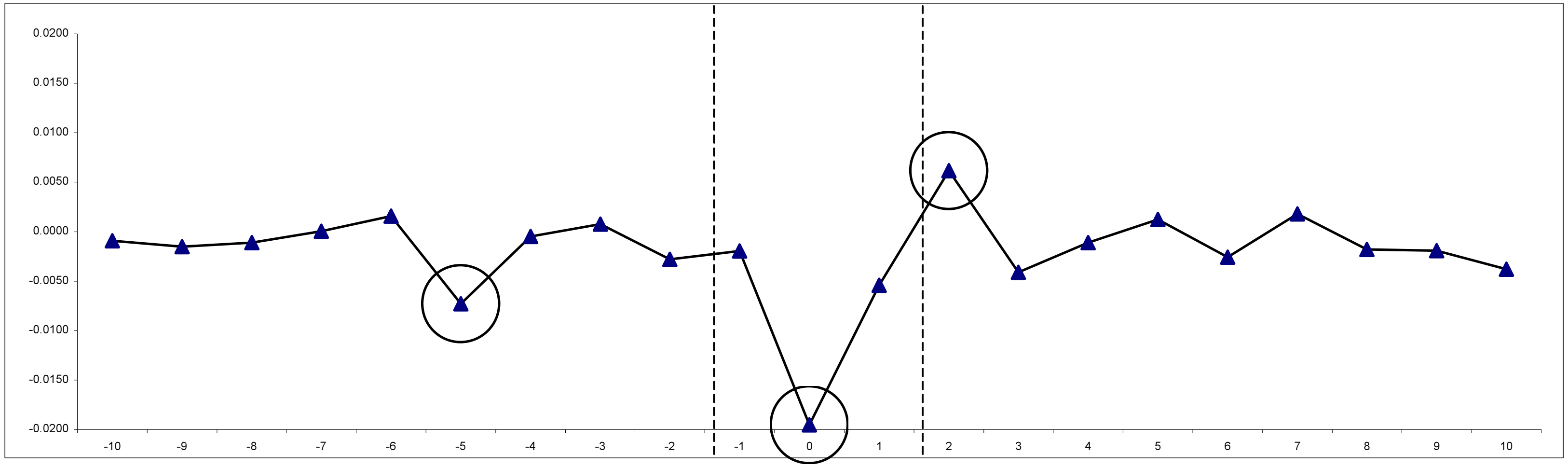
In Table 5-5, the three equivalent permutations of the DD-ED data set are examined, and again, the result corroborates Emanuel (1984) who found a significant negative AR associated with DD-ED announcements on weekly New Zealand returns data in the period from 1967 to 1979. With respect to the current study, the extreme form of a dividend reduction is the total omission of the dividend, which is a 100 percent reduction from the previous period. In Panel A of Table 5-5, which includes both forms of dividend reduction, the joint impact of a dividend reduction and an earnings reduction is a negative 1.95 percent AR (t-value = -3.67, p = 0.0003) on the announcement day, t_0. There is nothing significant to report for either of the other two days in the three-day test period. However, there is a small negative AR significant within the one percent level of error on day t_{-5}, and a positive correction on day t_2 that is significant within the five percent level of error. The Panel A means are plotted in Figure 5-5.

When, in Panel B of Table 5-5, the set of DD-ED announcements entailing a complete dividend omission is considered, the negative AR on the announcement day more than doubles in absolute magnitude to negative 4.88 percent (t-value = -4.11, p = 0.0001). This finding contrasts with Healy and Palepu (1988) who found significant negative returns on both t_0 and t_{-1} associated with omissions in the context of dividend-announcement only data.

Table 5-5: Abnormal Returns for DD-ED Announcements over the Test Period and Event Window.

Day	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
All DD-ED																					
Count	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182
Min	-0.1303	-0.1044	-0.0903	-0.0609	-0.0920	-0.3022	-0.1844	-0.0567	-0.0880	-0.1906	-0.4088	-0.2410	-0.1630	-0.2362	-0.1405	-0.0883	-0.1353	-0.1534	-0.2046	-0.1160	-0.2116
Max	0.2861	0.0806	0.0786	0.1288	0.1184	0.0768	0.0924	0.1035	0.0903	0.1864	0.1547	0.2204	0.2761	0.1100	0.1296	0.1229	0.0863	0.1417	0.1555	0.1195	0.1724
Mean	-0.0009	-0.0015	-0.0011	0.0001	0.0016	-0.0073	-0.0005	0.0008	-0.0028	-0.0020	-0.0195	-0.0054	0.0062	-0.0041	-0.0011	0.0012	-0.0026	0.0018	-0.0018	-0.0019	-0.0038
+ve/-ve	0.7170	1.1928	0.9362	0.9570	1.1667	0.7670	0.9783	1.1412	0.9158	0.9570	0.6106	0.7843	1.2750	0.9570	1.0682	1.0222	1.1928	1.1928	1.0449	1.0682	0.9783
St Dev	0.0320	0.0220	0.0216	0.0235	0.0241	0.0355	0.0269	0.0210	0.0225	0.0335	0.0719	0.0496	0.0373	0.0366	0.0299	0.0258	0.0272	0.0299	0.0307	0.0249	0.0316
t-test	-0.3818	-0.9323	-0.7000	0.0317	0.8917	-2.7721	-0.2354	0.4961	-1.6751	-0.7891	-3.6679	-1.4744	2.2276	-1.5156	-0.4982	0.6368	-1.2706	0.8067	-0.7816	-1.0491	-1.6161
p-value	0.7031	0.3524	0.4849	0.9748	0.3737	**0.0062**	0.8142	0.6204	0.0956	0.4311	**0.0003**	0.1421	**0.0271**	0.1314	0.6189	0.5251	0.2055	0.4209	0.4355	0.2956	0.1078
Omissions Only																					
Count	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
Min	-0.0823	-0.0900	-0.0903	-0.0476	-0.0695	-0.3022	-0.1844	-0.0545	-0.0880	-0.1906	-0.4088	-0.2410	-0.1630	-0.2362	-0.0813	-0.0883	-0.1353	-0.1246	-0.2046	-0.0826	-0.2116
Max	0.1048	0.0806	0.0786	0.1288	0.1184	0.0768	0.0924	0.0899	0.0903	0.1864	0.1547	0.1442	0.0883	0.1100	0.1296	0.1194	0.0863	0.0887	0.0842	0.1195	0.0477
Mean	-0.0008	-0.0007	-0.0051	0.0022	0.0040	-0.0129	-0.0034	-0.0008	-0.0045	-0.0052	-0.0488	-0.0028	0.0064	-0.0080	0.0003	0.0038	-0.0039	0.0025	-0.0061	-0.0035	-0.0070
+ve/-ve	0.6923	1.0625	0.8333	0.9412	1.3571	1.0625	0.6923	1.2000	1.2000	1.0000	0.3469	0.9412	1.2000	1.3571	1.2000	1.4444	1.2000	1.1290	0.8333	1.0000	0.8857
St Dev	0.0294	0.0245	0.0281	0.0301	0.0275	0.0504	0.0337	0.0209	0.0242	0.0447	0.0965	0.0655	0.0375	0.0530	0.0316	0.0325	0.0363	0.0351	0.0396	0.0305	0.0347
t-test	-0.2075	-0.2459	-1.4655	0.5996	1.1881	-2.0761	-0.8151	-0.2931	-1.5031	-0.9399	-4.1103	-0.3521	1.3758	-1.2222	0.0684	0.9512	-0.8826	0.5843	-1.2600	-0.9279	-1.6466
p-value	0.8363	0.8065	0.1476	0.5508	0.2391	**0.0418**	0.4180	0.7704	0.1377	0.3507	**0.0001**	0.7259	0.1736	0.2260	0.9456	0.3450	0.3807	0.5610	0.2122	0.3569	0.1045
Omisions Excluded																					
Count	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116	116
Min	-0.1303	-0.1044	-0.0739	-0.0609	-0.0920	-0.1413	-0.0782	-0.0567	-0.0747	-0.0780	-0.1814	-0.1588	-0.1026	-0.1332	-0.1405	-0.0694	-0.0622	-0.1534	-0.0921	-0.1160	-0.1073
Max	0.2861	0.0677	0.0626	0.0577	0.0814	0.0554	0.0869	0.1035	0.0892	0.1187	0.1375	0.2204	0.2761	0.0745	0.0906	0.1229	0.0702	0.1417	0.1555	0.0524	0.1724
Mean	-0.0010	-0.0020	0.0011	-0.0012	0.0002	-0.0041	0.0012	0.0016	-0.0018	-0.0001	-0.0029	-0.0069	0.0061	-0.0019	-0.0019	-0.0002	-0.0018	0.0014	0.0007	-0.0011	-0.0019
+ve/-ve	0.7313	1.2745	1.0000	0.9661	1.0714	0.6338	1.1887	1.1091	0.7846	0.9333	0.8125	0.7059	1.3200	0.7846	1.0000	0.8413	1.1887	1.2308	1.1887	1.1091	1.0351
St Dev	0.0335	0.0205	0.0166	0.0188	0.0219	0.0229	0.0222	0.0211	0.0215	0.0252	0.0459	0.0381	0.0374	0.0227	0.0289	0.0212	0.0204	0.0267	0.0242	0.0211	0.0297
t-test	-0.3193	-1.0294	0.7286	-0.6737	0.1029	-1.9432	0.5764	0.8384	-0.9183	-0.0588	-0.6801	-1.9510	1.7447	-0.9144	-0.7010	-0.1270	-0.9359	0.5533	0.3123	-0.5367	-0.7041
p-value	0.7501	0.3055	0.4677	0.5019	0.9182	0.0544	0.5655	0.4036	0.3604	0.9532	0.4978	0.0535	0.0837	0.3624	0.4847	0.8992	0.3513	0.5812	0.7554	0.5925	0.4828

Figure 5-5: Mean Values of Abnormal Returns over the Test Period - DD-ED Full Sample (Panel A) Only.



Circled means are significantly different from zero at the 5% level of error.

The day t_{-5} negative AR in Panel B also almost doubles in absolute magnitude, but its associated error is greater, now within the five percent level. However, the day t_2 correction has disappeared.[151]

In Panel C of Table 5-5, dividend omissions have been excluded from the DD-ED subsample. This has a dramatic effect on the pattern of ARs. Now there are small negative ARs on days t_{-5} and t_1 which are only weakly significant at the six percent level of error. There are no ARs at all with acceptably low levels of a Type 1 error. The inference to be drawn from this result is that investors in the New Zealand market are not overly worried by a reduction in dividends; but a total dividend omission does bother them. It is useful to remember at this point that the measure of change in dividends currently being used in the study, is the percentage change from the previous year; and that most companies pay dividends which are only a few cents per share. This means that a fifty percent reduction may well entail a drop in payment of maybe two or three cents per share. Overall, with respect to the DD-ED category, hypothesis H_{01} can be confidently rejected on the full sample containing both omissions and reductions, and on the subsample containing only omissions. But the subsample of only reductions does not allow us to reject the null hypothesis.

The four remaining relevant permutations of dividend and earnings announcements are ones in which the earnings change component conflicts with the dividend change component. Panel A of Table 5-6 contains the ARs associated with a decrease in dividend combined with an increase in earnings (DD-EI). The fact that there are only 38 observations indicates that company managers, in keeping with Lintner (1956) and Ghosh (1993), are generally reluctant to reduce dividends (thereby potentially annoying shareholders) unless a falling earnings trend makes this reduction necessary. The salient feature of Panel A is that it does not contain any ARs within the acceptable significance level of a five percent error. Nevertheless, the mean ARs reported in the test period are negative in sign. The negative AR in day t_2 is weakly significant with just over a five percent probability of error; but the other weakly significant AR in the panel for day t_{-2} (within a seven percent level of error), has a small positive mean. These results are indicative of the absence of any common response pattern among investors caught between enthusiasm for increased earnings and displeasure for a decreased dividend. The means are plotted in the more jagged line in Figure 5-6 that has no circles and hypothesis H_{01} cannot be rejected with respect to the DD-EI category of ARs.

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[151] In keeping with the DI-EI information in Figure 5-4, Figure 5-5 reports only the plotted means of the full set of DD-ED announcement ARs from Panel A.

Panel B of Table 5-6 contains the ARs associated with an increase in dividends in combination with a decrease in earnings (DI-ED). That there are more of these announcements than for the DD-EI combination in Panel A, again may be indicative of Lintner's (1956) findings. In this instance it is a plausible explanation that the company dividend-setters may prefer not to cut dividends when earning decreases are predicted to be temporary, and that they have a target dividend payout ratio to which they are continuing to adjust current dividends. In Panel B, only one AR mean is significant. It occurs outside the event window on day t_{-5}, in keeping with a similar quirk noted in Table 5-2 and Table 5-3. Again, hypothesis H_{01} cannot be rejected with respect to DI-ED category ARs.

The record for earnings increases in association with no change in announced dividends (DNC-EI) in Panel A of Table 5-7 has marginally less clarity. Again, no AR recorded in the three-day test period achieves acceptable statistical significance; but a small negative AR in day t_2 is significant within the five percent level of error. This day t_2 result is unexpected as it would be reasonable to predict that investors would be pleased with an earnings increase and indifferent about the maintenance of the dividend at last period's level. However, with respect to the DNC-EI category of ARs, H_{01} cannot be rejected.

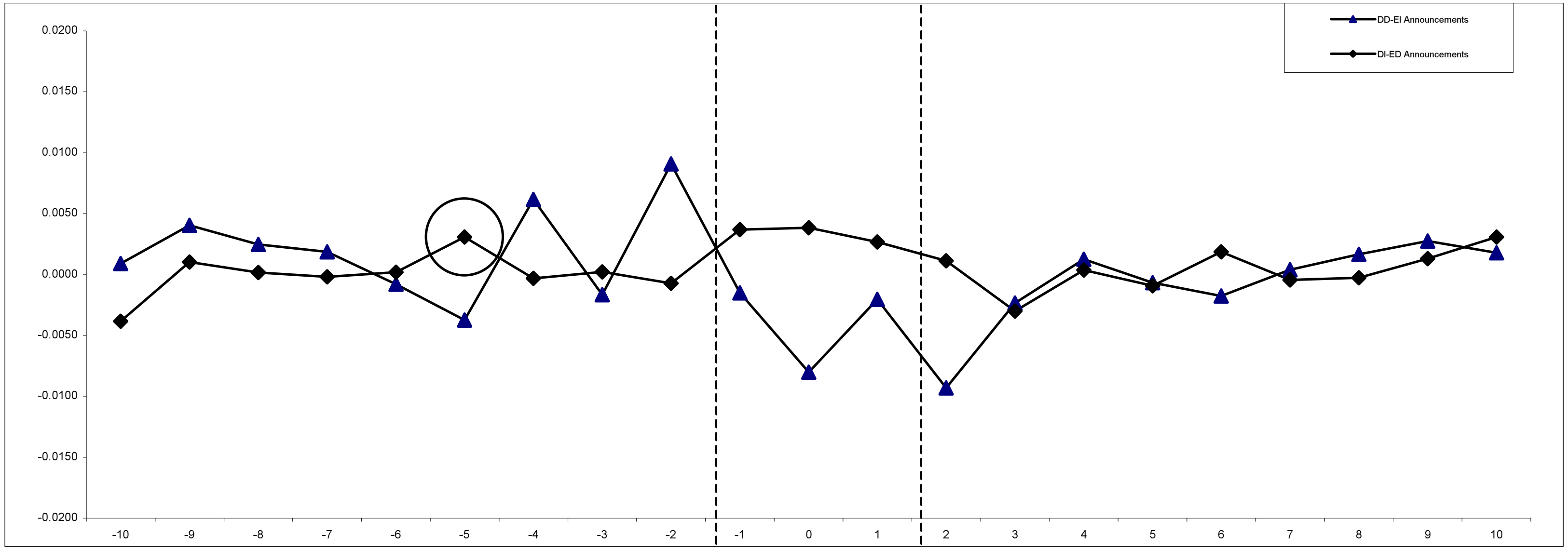
However, the combination of no change in dividend and a reduction in announced earnings (DNC-ED) is interpreted as relatively bad news by investors. In Panel B of Table 5-7 there are two small negative ARs significant at the five percent level of a Type 1 error, falling on the announcement day, t_0, (t-value = -2.39 p = 0.0179) and on the following day t_1, (t-value = -2.11, p = 0.0364). This AR output breaks the expected pattern of insignificant returns from mixed-message announcements in the event window and forces us to reject H_{01} in this instance. There is a further small negative AR which is weakly significant (t-value = -1.91, p = 0.0582) on day t_3.

In summary, the results in this section point to several phenomena. First, the two variables, ΔDPS and ΔEPS each have a discernible impact on event window ARs when considered without cognizance of the confounding effect of the other. Second, when this confounding effect is separated out into the individual permutations of the possible interaction between dividends announced and earnings announced, a systematic predictable pattern of ARs is recorded in the event window. DI-EI announcements produce positive ARs, DD-ED ones are associated with negative ARs, and mixed-message announcements produce insignificant ARs in the event window — with one exception, DNC-ED. Outside the event window, most ARs for all categories of announcement are insignificant. However, several significant ARs with respect to the DI-EI, DD-ED and DD-EI groups occur in the test period prior to the most widely-defined event window used in the study, which is days t_{-1}, t_0 and t_1. There may be some indication of information leakage here, because a signficant association is discovered between these and these particular dividend-and-earnings interaction variables in Appendix H.

Table 5-6: Abnormal Returns over the Test Period - DD-EI and DI-ED Announcements Only.

Day	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Panel A																					
DD-EI Announcements - Full Sample																					
Count	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Min	-0.0482	-0.1340	-0.0525	-0.0337	-0.0313	-0.0704	-0.0461	-0.0488	-0.0296	-0.0307	-0.1608	-0.0830	-0.0826	-0.0533	-0.0343	-0.0731	-0.0507	-0.0399	-0.0605	-0.0507	-0.0346
Max	0.0433	0.0626	0.0822	0.0511	0.0752	0.0615	0.2111	0.0367	0.1488	0.0619	0.0762	0.0689	0.0572	0.0730	0.0658	0.0815	0.0239	0.0252	0.1055	0.0946	0.0415
Mean	0.0009	0.0040	0.0025	0.0019	-0.0008	-0.0037	0.0062	-0.0017	0.0091	-0.0015	-0.0080	-0.0020	-0.0093	-0.0023	0.0012	-0.0007	-0.0018	0.0004	0.0017	0.0028	0.0018
+ve/-ve	0.9000	1.3750	1.3750	1.5333	0.6522	0.8095	1.7143	0.8095	1.9231	0.8095	0.9000	0.8095	0.6522	0.9000	1.1111	0.8095	0.9000	1.1111	1.1111	1.2353	0.9000
St Dev	0.0196	0.0288	0.0273	0.0187	0.0198	0.0270	0.0380	0.0171	0.0298	0.0195	0.0395	0.0303	0.0283	0.0243	0.0205	0.0279	0.0155	0.0145	0.0294	0.0238	0.0168
t-test	0.2850	0.8647	0.5568	0.6142	-0.2483	-0.8562	1.0018	-0.6010	1.8760	-0.4733	-1.2510	-0.4134	-2.0236	-0.5937	0.3760	-0.1464	-0.7022	0.1685	0.3496	0.7138	0.6513
p-value	0.7773	0.3928	0.5810	0.5428	0.8053	0.3974	0.3230	0.5515	0.0686	0.6388	0.2188	0.6817	0.0503	0.5564	0.7091	0.8844	0.4870	0.8671	0.7286	0.4798	0.5189
Panel B																					
DI-ED Announcements - Full Sample with 16 Dividend Initiations Removed																					
Count	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
Min	-0.0630	-0.0527	-0.0939	-0.0458	-0.0310	-0.0175	-0.0288	-0.0404	-0.0487	-0.0600	-0.0852	-0.0772	-0.0334	-0.0848	-0.0555	-0.1009	-0.0478	-0.0517	-0.0526	-0.0411	-0.0311
Max	0.0438	0.0470	0.0500	0.0482	0.0319	0.0496	0.0315	0.0271	0.0531	0.0492	0.1184	0.1331	0.0796	0.0419	0.0549	0.0592	0.0323	0.0761	0.0457	0.0494	0.0474
Mean	-0.0038	0.0010	0.0002	-0.0002	0.0002	0.0031	-0.0003	0.0002	-0.0007	0.0037	0.0038	0.0027	0.0011	-0.0030	0.0004	-0.0009	0.0019	-0.0004	-0.0003	0.0013	0.0031
+ve/-ve	0.8286	1.2069	1.0645	0.8824	1.2857	1.2069	0.6842	1.0000	0.8824	1.5600	1.2069	1.2069	1.0645	0.9394	0.7778	1.0645	1.3704	0.9394	1.1333	0.8824	1.3704
St Dev	0.0182	0.0150	0.0184	0.0138	0.0115	0.0119	0.0106	0.0131	0.0171	0.0177	0.0315	0.0273	0.0176	0.0192	0.0188	0.0196	0.0131	0.0194	0.0162	0.0140	0.0132
t-test	-1.6855	0.5432	0.0724	-0.1077	0.1305	2.0578	-0.2380	0.1353	-0.3387	1.6678	0.9715	0.7872	0.5126	-1.2465	0.1534	-0.3752	1.1369	-0.1850	-0.1291	0.7464	1.8640
p-value	0.0968	0.5889	0.9425	0.9146	0.8966	**0.0438**	0.8126	0.8928	0.7360	0.1003	0.3350	0.4341	0.6100	0.2172	0.8786	0.7087	0.2599	0.8539	0.8977	0.4582	0.0670

Figure 5-6: Mean Values of Abnormal Returns over the Test Period - DD-EI and DI-ED Announcements.

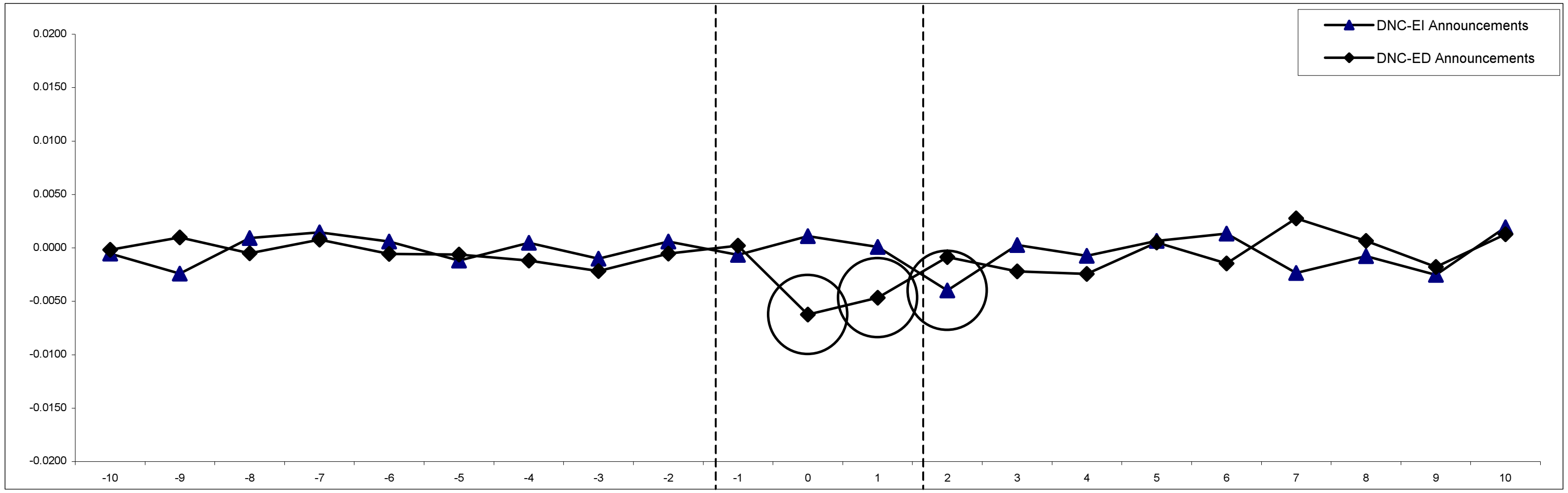


Circled means are significantly different from zero at the 5% level of error.

Table 5-7: Abnormal Returns over the Test Period - DNC-EI and DNC-ED Announcements Only.

Day	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
DNC-EI																					
Count	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Min	-0.0692	-0.0601	-0.0926	-0.0346	-0.2191	-0.0359	-0.0782	-0.0689	-0.0363	-0.0715	-0.0992	-0.1002	-0.1576	-0.0540	-0.0492	-0.0668	-0.0430	-0.1157	-0.0818	-0.1182	-0.0911
Max	0.0579	0.0568	0.0699	0.0443	0.1250	0.0518	0.1565	0.1205	0.0670	0.1151	0.1787	0.2449	0.0625	0.0591	0.0477	0.0858	0.1641	0.0620	0.0559	0.0702	0.0650
Mean	-0.0005	-0.0024	0.0009	0.0014	0.0006	-0.0012	0.0005	-0.0010	0.0006	-0.0006	0.0011	0.0001	-0.0040	0.0003	-0.0007	0.0007	0.0013	-0.0023	-0.0008	-0.0025	0.0019
+ve/-ve	0.8919	0.7500	0.9444	1.2951	1.0896	0.8182	0.7284	0.9718	0.8667	0.9444	0.7949	0.7284	0.6867	0.9718	0.7284	1.0000	0.7722	0.7284	0.7722	0.7500	1.1212
St Dev	0.0161	0.0163	0.0186	0.0137	0.0272	0.0123	0.0233	0.0201	0.0157	0.0208	0.0389	0.0321	0.0226	0.0169	0.0159	0.0181	0.0228	0.0180	0.0160	0.0221	0.0203
t-test	-0.3963	-1.7455	0.5870	1.2511	0.2543	-1.1261	0.2380	-0.5989	0.4475	-0.3652	0.3315	0.0320	-2.0807	0.1978	-0.5530	0.4321	0.6998	-1.5398	-0.5814	-1.3477	1.1251
p-value	0.6925	0.0831	0.5581	0.2130	0.7997	0.2620	0.8122	0.5502	0.6552	0.7156	0.7408	0.9746	**0.0393**	0.8435	0.5812	0.6663	0.4852	0.1259	0.5619	0.1800	0.2625
DNC-ED																					
Count	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197
Min	-0.0559	-0.0616	-0.1230	-0.0602	-0.0490	-0.0787	-0.0681	-0.0833	-0.1065	-0.0779	-0.2023	-0.1536	-0.1735	-0.0627	-0.1362	-0.0488	-0.0678	-0.1300	-0.0945	-0.1058	-0.1010
Max	0.0590	0.0922	0.0693	0.0889	0.0523	0.0584	0.1179	0.0807	0.0942	0.0696	0.0810	0.0881	0.1494	0.0510	0.0535	0.0902	0.1572	0.2543	0.0893	0.0552	0.0876
Mean	-0.0002	0.0010	-0.0005	0.0008	-0.0006	-0.0006	-0.0012	-0.0022	-0.0005	0.0002	-0.0063	-0.0047	-0.0009	-0.0022	-0.0024	0.0005	-0.0014	0.0028	0.0006	-0.0018	0.0013
+ve/-ve	0.9126	1.1889	0.9505	0.8762	0.8585	0.9126	0.9314	0.8411	0.9314	0.9899	0.8762	0.9505	0.9899	0.9314	0.8762	0.9700	0.7748	0.9899	0.9126	0.9700	0.9700
St Dev	0.0149	0.0160	0.0194	0.0187	0.0155	0.0181	0.0176	0.0184	0.0208	0.0182	0.0368	0.0311	0.0244	0.0162	0.0218	0.0170	0.0224	0.0273	0.0169	0.0187	0.0177
t-test	-0.1756	0.8454	-0.3751	0.5708	-0.5221	-0.4760	-0.9414	-1.6609	-0.3707	0.1562	-2.3874	-2.1065	-0.4920	-1.9055	-1.5744	0.4267	-0.9058	1.4261	0.5347	-1.3242	1.0114
p-value	0.8608	0.3989	0.7080	0.5688	0.6022	0.6346	0.3477	0.0983	0.7112	0.8760	**0.0179**	**0.0364**	0.6233	0.0582	0.1170	0.6701	0.3661	0.1554	0.5935	0.1870	0.3131

Figure 5-7: Mean Values of Abnormal Returns over the Test Period - DNC-EI and DNC-ED Announcements.



Circled means are significantly different from zero at the 5% level of error.

5.3 The Patterns Discernible in Three-day Cumulative Abnormal Returns (CARs)

Table 5-8 contains three-day CARs associated with DI-EI calculated over the full test period with the event window CARs in the central column. In all three panels, the null hypothesis H_{02} (reprinted here for convenience) must be rejected with respect to DI-EI category CARs spanning the announcement day.

H_{A2}: The mean three-day CAR generated over the days spanning the public release of the announcement (days t_{-1}, t_0 and t_1) and grouped by direction of change of dividend and direction of change in earnings category, will be statistically indistinguishable from zero.

Figure 5-8: Mean Values of Three-day CARs over the Test Period - DI-EI and DD-ED Announcements.

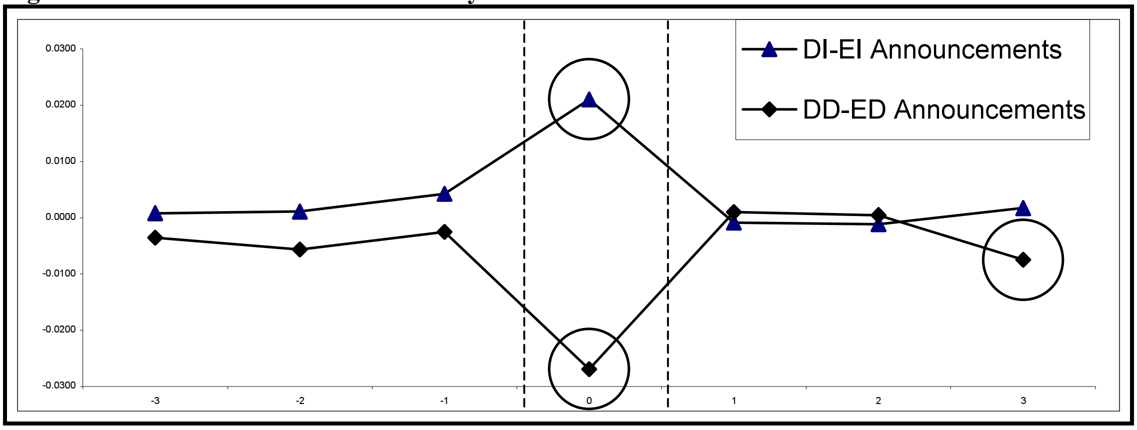


Table 5-8: DI-EI CARs for t_{-3} to t_3.

Panel A: DI-EI Announcements - Full Sample							
	CAR_{-3}	CAR_{-2}	CAR_{-1}	CAR_0	CAR_1	CAR_2	CAR_3
Count	311	311	311	311	311	311	311
Mean	0.0012	0.0020	0.0038	0.0228	-0.0030	-0.0044	0.0018
St Dev	0.0435	0.0338	0.0367	0.0713	0.0390	0.0358	0.0345
t-test	0.4855	1.0390	1.8088	**5.6495**	-1.3480	**-2.1926**	0.8994
p-value	0.6277	0.2996	0.0714	**0.0000**	0.1787	**0.0291**	0.3691
Panel B: DI-EI Announcements - Initiations and Resumptions only							
Count	67	67	67	67	67	67	67
Mean	0.0026	0.0054	0.0020	0.0294	-0.0108	-0.0166	0.0019
St Dev	0.0665	0.0341	0.0414	0.0842	0.0487	0.0480	0.0394
t-test	0.3205	1.2836	0.3977	**2.8563**	-1.8072	-2.8249	0.4043
p-value	0.7496	0.2038	0.6921	**0.0057**	0.0753	0.0062	0.6873
Panel C: DI-EI Announcements - Without Initiations and Resumptions							
Count	244	244	244	244	244	244	244
Mean	0.0008	0.0011	0.0042	0.0210	-0.0008	-0.0011	0.0017
St Dev	0.0348	0.0337	0.0354	0.0674	0.0356	0.0309	0.0331
t-test	0.3640	0.4947	1.8747	**4.8765**	-0.3685	-0.5679	0.8058
p-value	0.7161	0.6213	0.0620	**0.0000**	0.7128	0.5706	0.4212

In Panel A, the cumulative mean over the event window was 2.28 percent (t-value = 5.65, $p < 0.0000$). One other DI-EI three-day CAR in the test period was significant within the five percent level of error. This was the CAR for days t_5, t_6 and t_7. In addition, the CAR covering days t_{-4}, t_{-3} and t_{-2} had weak significance (t-value = 1.81, $p = 0.0715$). However these other CARs do not create a meaningful pattern. The mean for initiations and resumptions only in Panel B is higher at 2.94% and the mean for DI-EI CARs without initiations and resumptions is slightly lower at 2.10%. This indicates that, as a group, initiations and resumptions have a stronger effect on investors than when the announced dividend is just one of an ongoing series.

The pattern in Table 5-9 for DD-ED three-day CARs is of a similar nature.

Table 5-9: DD-ED CARs for t_{-3} to t_3.

Panel A: DD-ED Announcements - Full Sample							
	CAR_{-3}	**CAR_{-2}**	**CAR_{-1}**	**CAR_0**	**CAR_1**	**CAR_2**	**CAR_3**
Count	182	182	182	182	182	182	182
Mean	-0.0035	-0.0057	-0.0025	-0.0269	0.0009	0.0004	-0.0075
St Dev	0.0439	0.0452	0.0398	0.0898	0.0559	0.0469	0.0503
t-test	-1.0911	-1.6858	-0.8436	**-4.0440**	0.2283	0.1288	**-2.0134**
p-value	0.2767	0.0936	0.4000	**0.0001**	0.8196	0.8977	**0.0456**
Panel B: DD-ED Announcements - Omissions only							
Count	66	66	66	66	66	66	66
Mean	-0.0066	-0.0066	-0.0086	-0.0568	-0.0013	0.0024	-0.0167
St Dev	0.0493	0.0582	0.0478	0.1105	0.0661	0.0523	0.0607
t-test	-1.0802	-0.9273	-1.4644	**-4.1764**	-0.1654	0.3692	**-2.2276**
p-value	0.2841	0.3572	0.1479	**0.0001**	0.8692	0.7132	**0.0294**
Panel C: DD-ED Announcements - Without Omissions							
Count	116	116	116	116	116	116	116
Mean	-0.0018	-0.0051	0.0010	-0.0099	0.0022	-0.0006	-0.0023
St Dev	0.0406	0.0362	0.0342	0.0707	0.0494	0.0437	0.0426
t-test	-0.4874	-1.5164	0.3135	-1.5130	0.4900	-0.1599	-0.5799
p-value	0.6269	0.1322	0.7545	0.1330	0.6251	0.8732	0.5631

In Panel A, the three-day window mean was negative 2.69% (t-value = -4.04, $p = 0.0001$); but the final three days of the test period also yielded a significant CAR with a mean of negative 0.17 percent (t-value = -2.01, $p = 0.0456$). This echo response may be indicative of small shareholders having had time to receive the news by mail from the company (the mailout being concurrent with disclosure to the Stock Exchange) and act on it via a stockbroker. However, there is no hard evidence to suggest that this is necessarily so. The mean of the subset of responses to a dividend omission in Panel B is greater at –5.68% (t-value = -4.18, $p = 0.0001$), while in Panel C, dividend reductions net of omission observations remain insignificant. In

Panels A and B there is some evidence of a further negative AR significant at the five percent level of error with respect to the CAR covering days t_8, t_9 and t_{10}. There is no immediate explanation for this. In keeping with what was found with respect to the one-day ARs in the DD-ED category, hypothesis H_{02} can be rejected on the full sample and on the subsample of omission only, but not on the subsample of only mere reductions in dividend.

Figure 5-9: Mean Values of Three-day CARs over the Test Period - DD-EI and DI-ED Announcements.

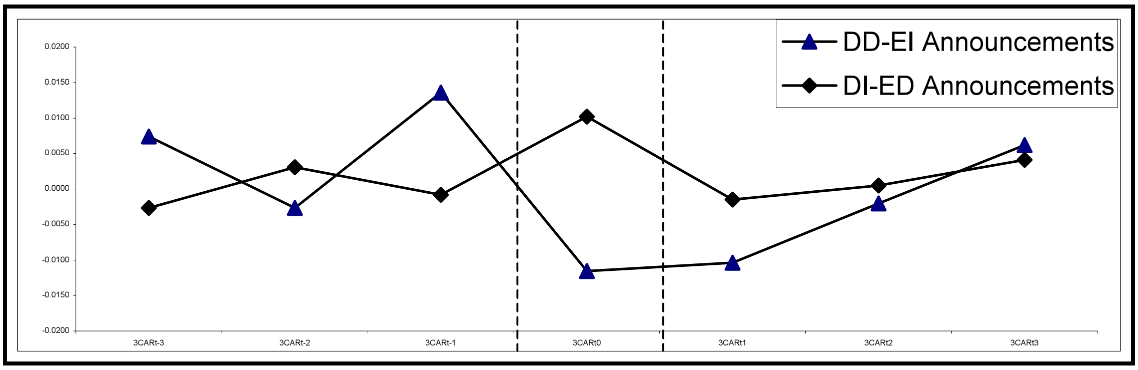


Table 5-10: DD-EI and DI-ED CARs for t_{-3} to t_3.

Panel A: DD-EI Announcements - Full Sample (Includes 9 Omissions)							
	CAR_{-3}	CAR_{-2}	CAR_{-1}	CAR_0	CAR_1	CAR_2	CAR_3
Count	38	38	38	38	38	38	38
Mean	0.0074	-0.0027	0.0136	-0.0115	-0.0104	-0.0020	0.0062
St Dev	0.0444	0.0365	0.0431	0.0556	0.0353	0.0378	0.0435
t-test	1.0292	-0.4523	1.9411	-1.2797	-1.8155	-0.3302	0.8777
p-value	0.3100	0.6537	0.0599	0.2086	0.0776	0.7431	0.3858
Panel B: DI-ED Announcements - Full Sample (Includes 16 Initiations or Resumptions)							
Count	80	80	80	80	80	80	80
Mean	-0.0023	0.0014	-0.0004	0.0085	-0.0028	0.0001	0.0019
St Dev	0.0264	0.0277	0.0243	0.0451	0.0371	0.0329	0.0255
t-test	-0.7708	0.4641	-0.1623	1.6879	-0.6719	0.0191	0.6522
p-value	0.4431	0.6439	0.8715	0.0954	0.5036	0.9848	0.5162

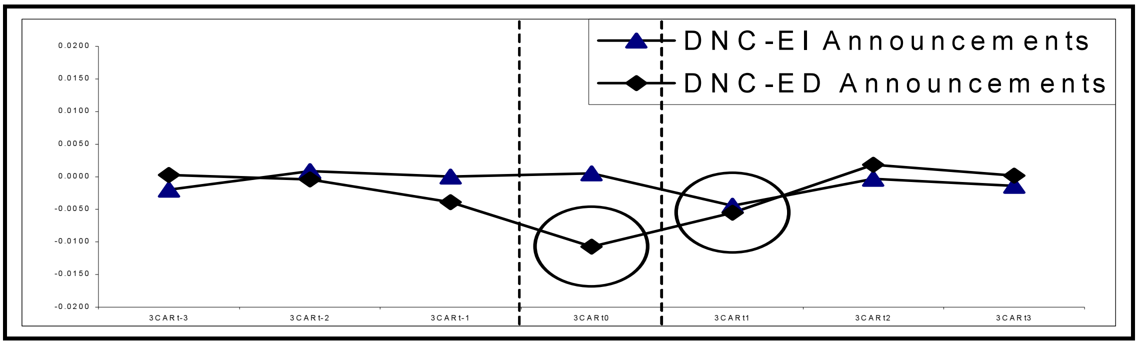
In Table 5-10 there are no three-day CARs significant within the five percent level of error. This suggests that the impact of earnings change and dividend change cancel each other out in the mixed message announcements, DD-EI and DI-ED. Hence, the null hypothesis H_{02} cannot be rejected for either of these categories. There were actually 9 instances of dividend omissions in the DD-EI data set and 16 instances of dividend initiations or resumptions in the DI-ED set. These have not been reported in further panels as they separately did not furnish significant results.

The DNC-EI observations tabled in Panel A of Table 5-11 are similarly insignificant. Hence the null hypothesis H_{02} cannot be rejected with respect to DNC-EI results. But this pattern is broken in Panel B where the DNC-ED three-day CARs are strongly significant in both the event window where there was a mean of negative 1.07% (t-value = -2.79, p = 0.0059) and over the ensuing three days when a further CAR with a mean of negative 0.55% was generated (t-value = -2.23, p = 0.0271). Therefore, for the DNC-ED category, the null hypothesis, H_{02} is rejected.

Table 5-11: DNC-EI and DNC-ED CARs for t_{-3} to t_3.

Panel A: DNC-EI Announcements							
	CAR_{-3}	CAR_{-2}	CAR_{-1}	CAR_0	CAR_1	CAR_2	CAR_3
Count	140	140	140	140	140	140	140
Mean	-0.002011	0.000857	0.000049	0.000535	-0.004435	-0.000337	-0.001375
St Dev	0.026846	0.033839	0.036772	0.049298	0.031882	0.029919	0.032462
t-test	-0.886257	0.299748	0.015638	0.128324	-1.645924	-0.133278	-0.501129
p-value	0.377010	0.764817	0.987546	0.898078	0.102039	0.894166	0.617073
Panel B: DNC-ED Announcements							
Count	197	197	197	197	197	197	197
Mean	0.000261	-0.000430	-0.003906	-0.010714	-0.005502	0.001840	0.000153
St Dev	0.029372	0.028123	0.030708	0.053997	0.034672	0.039926	0.032316
t-test	0.124701	-0.214366	-1.785416	**-2.784981**	**-2.227152**	0.647009	0.066495
p-value	0.900888	0.830484	0.075740	**0.00587819**	**0.027075**	0.518383	0.947052

Figure 5-10: Mean Values of Three-day CARs over the Test Period - DNC-EI and DNC-ED Announcements.



It is instructive to compare the magnitude of this phenomenon, which I have argued is related to investors' reaction to an announced drop in earnings, with the magnitude of the negative CARs over the same six days in the DD-ED case in Panel B of Table 5-9. Over the six days (t_{-1} to t_4) in Table 5-9 the mean DD-ED CAR is negative 2.6 percent, while in Table 5-11, the DNC-ED event window CAR plus the CAR immediately following amount to negative 1.62 percent. In other words, the severity of the reaction to the announced drop in earnings is muted to the tune of almost one percentage point by the fact that in Panel B of Table 5-11, the companies announced dividends unchanged from the previous period.[152]

Effectively, the three-day CARs of Table 5-8 to Table 5-11 corroborate the pattern already found with respect to ARs in Section 5.2; so it would be appropriate at this point to step back from the minutiae of the results and consider the implications in overview. So far it has been revealed that DI-EI three-day event-window CARs provide an average holding gain of 2.1 percent for an investor while the equivalent DD-ED holding loss is 2.69 percent. These figures imply that an astute investor could make money on short-term trading. On the face of it, this contradicts Watts (1973) who found that the information content of dividends was economically insignificant — albeit that Watts was observing the behaviour of returns based on stand-alone dividend announcements in the United States. But an important question has not been addressed. The mere existence of ARs and CARs is not enough. Can they be related back to the dividend information and earnings information furnished in an announcement? Can we show that the announcement content is actually responsible for the ARs and CARs that coincide with it? The nature of such a causal link may be examined via the circumstantial evidence furnished by RLS regression analysis.[153] This occurs in the next section.

5.4 Linked Regressions with Dummy Variables on the Three-day CARs of the Event Window

In this section I will show the results obtained from using the three-day CARs of the event window (t_{-1}, t_0, t_1) as the dependent variable (CAR3Day) in a series of regressions in which percentage change in announced earnings (ΔEPS) and percentage change in announced dividends (ΔDPS) are the two independent variables. Initially, I will show how each independent variable interacts with CAR3Day in isolation, then I will proceed on to a series of restricted least squares regressions utilising a set of dummy variables representing the interaction effects between the two independent variables. But first two small items of housekeeping need to be covered.

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[152] A period is defined as twelve months earlier with some latitude for variation, when the previous announcement of the same type (mid-year or year-end) was published.

[153] Regression output provides circumstantial evidence only. We may choose to imply causation from it; but the output provides evidence of a relationship (or lack of it) only; and 'relationship' is a broader, less definitive (or judgemental) term than 'causation'. We may conclude causation from our inferences, but that conclusion must remain tentative.

5.4.1 Removal of Dividend Initiation Observations and Reporting of Early and Late Subsamples

From this point, the data set is going to be temporarily reduced from 948 to 865 observations with the removal of all dividend initiations and resumptions (67 DI-EI data points and 16 DI-ED data points). This is because the ΔDPS configuration used here is:

$$\Delta DPS = \frac{DPS_{ANNOUNCED} - DPS_{LAST\ YEAR}}{DPS_{LAST\ YEAR}} \tag{5.1}$$

A zero dividend (i.e., no dividend) for last year in the denominator leaves the variable undefined. It is clear from Table 5-4 that initiations and resumptions produce ARs which are qualitatively similar to (although quantitatively more impressive than) those produced by increases in existing dividends. From this it is reasonable to assume if dividend increases produce weaker effects than dividend initiations (and resumptions), then a statistically significant regression result obtained from the data set of dividend increases should also be a reasonable predictor of the results obtainable if the initiations and resumptions had been left in the data set. Removal of these data points will not change the qualitative nature of the impact made by dividend announcement data — but this removal of the observations associated with the largest observed CARs may mute down any evidence that there is a dividend signal.[154]

The corollary to the above discussion of dividend initiations and resumptions is a similar discussion of the treatment of dividend omission data points. However, in this instance, there is a qualitative difference as well as a quantitative difference between dividend reductions and omissions. As shown in Panel C of Table 5-9, dividend reductions (that are not omissions) appear to have no significant impact on the market in New Zealand. Therefore the inclusion of omissions does make an important difference. Further, as stated earlier the percentage level of a dividend omission is not an arbitrarily set value — it is an incontrovertible negative 100 percent.

The second item concerns the finding in the last chapter that the variance of the EPS observations calculated within the study from announcement data was quite different from that of the EPS figures supplied in announcements from mid-May 1996. The latter EPS were fully

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[154] A possible alternative would have been to assign ΔDPS an arbitrary value. I looked into this, but found it unsatisfactory. Consider the size of dividends in New Zealand generally. They tend to be quite small. If last period's announced dividend was two cents per share, an increase of one cent this period is a 50 percent increase. An increase by three cents to a five cent dividend would represent a 150 percent increase. This sort of increase in the data set is not out of the ordinary; and to restrict the sample to data points in which the maximum dividend increase could be 100 percent would distort the analysis. On the other hand, setting a value of more than 100 percent on a dividend initiation would be bizarre; while settling for an arbitrary value of 100 percent for initiations while allowing other data points to take on higher values would also be bizarre. I did consider setting the value at 1,000 percent, but this was distortionary. Therefore dividend initiation and resumption data points are deleted, with respect to this formulation of the variable from the sample as of this point.

diluted while the former were simple in format (since insufficient data was available concerning unexercised options etc). The discovery of this difference forced a choice. Either all observations before May 13^{th} 1996 should be deleted from the study, or the results should be reported on these as an early subsample separately from results reported with respect to observations from May 13^{th} 1996 onwards. Given that investors would probably have made similar calculations to those made by me to obtain EPS, it is likely that the 'early subsample' will remain a valid tool in the search for evidence of a dividend signal in the first part of the 1990s.

On that basis, three sets of each regression are reported in the ensuing tables. In the first column, are the results for the entire sample of 865 observations. In the second column are the results on the subsample in which ΔEPS was calculated in the study for all announcement events prior to (and including) May 8^{th} 1996. The third column will contain the results for the rest of the decade when the announcement disclosure itself was required to contain explicit EPS information. Where a result is significant within the five percent level of a Type 1 error, the cell is filled with a light grey background.

5.4.2 Regression Results

In this section, a three-day event window will be used; and the equivalent results for a one-day window will be furnished in Appendix E.

Table 5-12 contains the results of two simple regressions in which ΔEPS and then ΔDPS is employed as the independent variable, and also a regression in which both independent variables feature. All of the regressions are reliable in terms of their *F*-statistics; but the adjusted R^2 figures are very low. When ΔEPS is the sole independent variable (Regression 1), the relationship between the recorded 1.18 percent change in three-day CARs per unit change in ΔEPS is strongly significant at the five percent level. But when both percentage change variables are introduced into the procedure (Regression 3), a unit rise in ΔEPS reduces to a mere 0.85% increase in CAR3Day. By contrast, a unit rise in ΔDPS is associated with a 3.38% increase in CAR3Day in the same set of results.

It is interesting that when ΔDPS is the sole regressor in the late subsample in Table 5-12, it fails to furnish a statistically significant coefficient, while on the early subsample it most certainly did. This cannot be related to the influence of how EPS was calculated as EPS is not present in this estimation. Perhaps we are seeing here material evidence in New Zealand of the decline in importance of dividends in general that was observed elsewhere at the end of the twentieth century prior to the bursting of the Dot-Com Bubble.

Table 5-12: Stepwise Regressions on First-order Variables.

Regressand	ARt_0		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Regression with Change in Earnings Only EQUATION (i)			
(INTERCEPT)	-0.0013 (0.4648)	-0.0028 (0.2470)	-0.0005 (0.8586)
ΔEPS	0.0017 (0.0096)	0.0063 (0.0001)	0.0009 (0.2129)
Regression with Change in Dividends Only EQUATION (ii)			
(INTERCEPT)	-0.0019 (0.2840)	-0.0035 (0.1317)	-0.0007 (0.7981)
ΔDPS	0.0188 (0.0000)	0.0281 (0.0000)	0.0133 (0.0003)
Regression with Change in Earnings and Dividend EQUATION (iii)			
(INTERCEPT)	-0.0019 (0.2759)	-0.0039 (0.0914)	-0.0007 (0.7971)
ΔEPS	0.0006 (0.3793)	0.0037 (0.0227)	0.0002 (0.7846)
ΔDPS	0.0182 (0.0000)	0.0255 (0.0000)	0.0130 (0.0006)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)			
N	865	441	424
Adj $R^2_{\text{EQUATION (i)}}$	0.0066	0.0302	0.0013
Adj $R^2_{\text{EQUATION (ii)}}$	0.0511	0.0909	0.0284
Adj $R^2_{\text{EQUATION (iii)}}$	0.0508	0.0996	0.0263
$F_{\text{EQUATION (i)}}$	6.7424 (0.0096)	14.7160 (0.0001)	1.5563 (0.2129)
$F_{\text{EQUATION (ii)}}$	47.5130 (0.0000)	45.0140 (0.0000)	13.3830 (0.0003)
$F_{\text{EQUATION (iii)}}$	24.1370 (0.0000)	25.3370 (0.0000)	6.7141 (0.0013)

This decline was discussed by Fama and French (2001), who noted that the disbursement of dividends by US firms had been declining steadily since 1978.

The procedure reported in Table 5-13 is the result of a three-part linked regression procedure involving the following set of equations, the first of which contains a single dummy variable relating to change in earnings:

$$\begin{aligned} &1.\quad CAR3day = \alpha + \beta_1 \Delta EPS + \beta_2 \Delta DPS + \beta_3 Dummy_{\Delta EPS>0} + \varepsilon \\ &2.\quad CAR3day = \alpha + \beta_1 \Delta EPS + \beta_2 \Delta DPS + \varepsilon \\ &3.\quad CAR3day = \alpha + \beta_1 Dummy_{\Delta EPS>0} + \varepsilon \end{aligned} \tag{5.2}$$

Equation 1 of the set is known as the unrestricted regression. The dummy variable here represents an announced rise in earnings (ignoring all changes in dividends); and its presence converts the intercept term into a measure of announced decreases in earnings (ignoring all changes in dividends). Equation 2 is restricted to the two primary independent variables, and is indeed the regression reported in Table 5-12. Equation 3 is restricted to an assessment of the rise-in-earnings dummy only — and of the effect of a fall in earnings via the behaviour of the intercept term.

Table 5-13: RLS Regression with Respect to Earnings Behaviour.

Regressand	CAR3Day		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)			
Falling earnings (INTERCEPT)	-0.0104 (0.0012)	-0.0174 (0.0004)	-0.0024 (0.5688)
ΔEPS	0.0006 (0.5132)	0.0067 (0.0053)	-0.0001 (0.8736)
ΔDPS	0.0200 (0.0000)	0.0294 (0.0000)	0.0143 (0.0018)
Rising earnings	0.0161 (0.0008)	0.0166 (0.0236)	0.0104 (0.1139)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)			
N	865	441	424
Adj $R^2_{\text{UNRESTRICTED}}$	0.0661	0.1255	0.0335
Adj $R^2_{\text{EQUATION (ii)}}$	0.0550	0.1172	0.0301
Adj $R^2_{\text{EQUATION (iii)}}$	0.0346	0.0622	0.0147
$F_{\text{UNRESTRRICTED}}$	21.3690 (0.0000)	22.0510 (0.0000)	5.8907 (0.0006)
$F_{\text{EQUATION (ii)}}$	26.1390 (0.0000)	30.2120 (0.0000)	7.5538 (0.0006)
$F_{\text{EQUATION (iii)}}$	31.9600 (0.0000)	30.1690 (0.0000)	7.3001 (0.0072)
$F_{\text{FIRST ORDER}}$	15.5447 (0.0000)	16.9011 (0.0000)	5.1195 (0.0064)
$F_{\text{INTERACTION}}$	11.2210 (0.0008)	5.1472 (0.0238)	2.5215 (0.1131)

In Table 5-13 (and in all tables of linked regression results), the final two rows report two extra F-statistics. The first-order F-statistic is a measure of the strength and reliability of the relationship between the dependent variable and the two first-order independent variables, ΔDPS and ΔEPS jointly. The interaction F-statistic is a measure of the strength and reliability of the relationship between the dependent variable and the interaction variables represented by the dummy and constant term in Equations 1 and 3.[155]

In Table 5-13, the first point of interest is that, with respect to the early subsample, the unit fall in earnings (ignoring dividend changes) modelled by the intercept term corresponds with a strongly significant 1.74 percent drop in the dependent variable, CAR3Day (p = 0.0004). This information is provided in the results for the constant term for the unrestricted regression (Equation 1). Further, the significance of the dummy variable modeling earnings increases (ignoring dividend information) is similar (p = 0.0236). This indicates that a unit rise in 'earnings-change-upward' relates to a 1.66 percent rise in CAR3Day. These two results are also in the full sample in column one; and both the full sample and the early sample furnish significant interaction F-statistics (the full sample at the one percent level of error and the early subsample at the five percent level).

These interaction variable results enable us to reject the null of the hypothesis (shown in its alternative form here) on these two samples:

H_{A3}: The market reacts to interactions between dividend-change and earnings-change published in a joint announcement in a manner distinguishable from the separate impacts of percentage change in earnings announced and percentage change in dividend announced.

Further in the early subsample, a unit increase in the first-order variable, ΔDPS corresponds with a 2.94 percent increase in CAR3Day (p < 0.0000); and a unit increase in ΔEPS corresponds with a rather more spindly 0.67 percent increase in CAR3Day, which is still significant at the one percent level of error. These ΔDPS results also occur in the full sample; but ΔEPS in that sample lapses into insignificance. However, the first-order F-statistics for the early subsample and for the full sample are both strongly significant. This allows us to reject the null form of the hypothesis H_4 (printed in alternative form):

H_{A4}: The first-order variables, ΔDPS and ΔEPS are jointly related to CARs generated, during the three-day event window, by investor activity following joint announcements.

[155] A full explanation of the joint F-testing of restricted least squares regressions is provided in Gujarati, Damodar N., "Basic Econometrics" Third Edition, (1995). See Section 8.7 "Restricted Least Squares: Testing Linear Equality Restrictions", pp 256 – 262.

This early subsample result is congruent with Easton and Sinclair (1989). When they controlled for a dividend effect by leaving dividend random in their data set, they found a significant earnings effect over quintile portfolios ranked by the magnitude of the variable, unexpected earnings. In other words, a rise or fall in earnings in the presence of a dividend announcement is not autonomously significant, but the individual permutations of rises or falls in earnings in conjunction with an associated dividend-change announcement are highly significant.

The results for the late subsample data set reported in the third column are quite different. Only the first-order F-statistic is significant and the only regressor found to have a significant coefficient was ΔDPS. Here a unit increase in ΔDPS corresponded with a 1.43 percent increase in CAR3Day at the one percent level of error. This allows us to reject H_{04}, but not H_{03}.

Table 5-14 repeats the exercise in Table 5-13 with one alteration — a new RLS equation set. In Equation (5.3) there are two dummy variables. The first represents a rise in announced dividend (ignoring earnings change); and the second stands for a situation of no change in the announced dividend (ignoring earnings change). The intercept term in the unrestricted equation proxies a fall in announced dividend (ignoring earnings change):

$$\begin{aligned}
&1.\ \ CAR3day = \alpha + \beta_1 \Delta EPS + \beta_2 \Delta DPS + \beta_3 D_{\Delta DPS>0} + \beta_4 D_{\Delta DPS=0} + \varepsilon \\
&2.\ \ CAR3day = \alpha + \beta_1 \Delta EPS + \beta_2 \Delta DPS + \varepsilon \\
&3.\ \ CAR3day = \alpha + \beta_1 D_{\Delta DPS>0} + \beta_2 D_{\Delta DPS=0} + \varepsilon
\end{aligned} \tag{5.3}$$

In the late subsample in Table 5-14, the coefficient for ΔEPS is so tiny it does not register at four decimal places and is not significant, and ΔDPS is also insignificant. Hence for this subsample, H_{04} cannot be rejected. However the interaction dummy for rising dividends is significant in this subsample at the one percent level of error. This significance is corroborated by an interaction F-statistic that is significant at the five percent error level, which allows us to reject the null hypotheses, H_{03}. The dividend-no-change dummy remained insignificant along with falling dividends (modeled by the intercept).

With respect to the simple EPS formulation in the early subsample, most of these results are reversed. In this subsample, the rising dividend dummy is insignificant; but the intercept term (falling dividends) is significant at the five percent level and has the expected negative sign.

Table 5-14: Restricted Least Squares Regression for Change in Dividends.

Regressand	CAR3Day		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)			
Falling dividends (INTERCEPT)	-0.0166 (0.0013)	-0.0173 (0.0410)	-0.0123 (0.0529)
ΔEPS	0.0010 (0.2646)	0.0080 (0.0006)	0.0000 (0.9904)
ΔDPS	0.0125 (0.0078)	0.0234 (0.0059)	0.0072 (0.1857)
Rising Dividends	0.0286 (0.0002)	0.0203 (0.1024)	0.0281 (0.0046)
DNC	0.0107 (0.0888)	0.0026 (0.7962)	0.0146 (0.0668)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)			
N	865	441	424
Adj $R^2_{UNRESTRICTED}$	0.0693	0.1228	0.0440
Adj $R^2_{EQUATION\ (ii)}$	0.0550	0.1172	0.0301
Adj $R^2_{EQUATION\ (iii)}$	0.0609	0.0824	0.0444
$F_{UNRESTRRICTED}$	17.0870 (0.0000)	16.3950 (0.0000)	5.8671 (0.0001)
$F_{EQUATION\ (ii)}$	26.1390 (0.0000)	30.2120 (0.0000)	7.5538 (0.0006)
$F_{EQUATION\ (iii)}$	29.0100 (0.0000)	20.7430 (0.0000)	10.8150 (0.0000)
$F_{FIRST\ ORDER}$	4.8972 (0.0077)	11.0955 (0.0000)	0.9270 (0.3966)
$F_{INTERACTION}$	7.6308 (0.0005)	2.3879 (0.0930)	4.0813 (0.0176)

But this is not supported by the interaction *F*-statistic, which is only tenuously significant at the ten percent level of error. Further, the insignificance of the DNC dummy confirms the diagnosis made in Sections 5.2 and 5.3 that announcements of unchanged dividends do not excite investors. These early subsample results individually and collectively fall short of allowing us to reject the null hypothesis, H_{03}.

With respect to the first-order variables in the early subsample, both are significant at the one percent level of error, and the ΔDPS coefficient shows that a unit increase in this variable is associated with a 2.34 percent rise in CAR3Day. A unit increase in ΔEPS, by contrast, relates to a rise in CAR3Day of 0.80 percent, which is approximately one third this size. This significance is corroborated by a strongly significant first-order *F*-statistic which causes us to reject the null hypothesis H_{04}. These results indicate that the percentage change (from twelve months earlier) in an announced dividend is picked up and acted upon by investors. This is a much stronger finding in favour of a dividend effect than was found by Easton and Sinclair (1989) on Australian data, when they organized unexpected dividend changes into quintile portfolios, leaving earnings data random. They found that the dividend effect was much weaker than the earnings effect.

Some comment should also be made about the results in Table 5-14 for the full sample in column one — keeping in mind the underlying flaw in this sample. Here the rising dividend and falling dividend interaction effects are strongly significant while the DNC interaction dummy remains insignificant. These are corroborated by a strongly significant interaction F-statistic at the bottom of column one. This most certainly allows us to reject the null hypothesis H_{03}. Further, ΔDPS in the unrestricted estimation is strongly significant (although ΔEPS remains quite insignificant); and the full sample's first-order F-statistic is also strongly significant. The association between ΔDPS and CAR3Day is strongly confirmed and null hypothesis H_{04} is rejected.

At this point we reach the RLS regression procedure modeling all six of the categories of direction of earnings-and-dividend change, which are tabulated in Table 5-15 and formulated in Equation (5.4):

$$\begin{aligned}
&1.\quad CAR3day = \alpha + \beta_1 \Delta EPS + \beta_2 \Delta DPS + \beta_3 D1 + \beta_4 D2 \\
&\qquad\qquad + \beta_5 D3 + \beta_6 D4 + \beta_7 D5 + \varepsilon \\
&2.\quad CAR3day = \alpha + \beta_1 \Delta EPS + \beta_2 \Delta DPS + \varepsilon \\
&3.\quad CAR3day = \alpha + \beta_1 D1 + \beta_2 D2 + \beta_3 D3 + \beta_4 D4 + \beta_5 D5 + \varepsilon
\end{aligned} \tag{5.4}$$

The first salient feature here is that, while ΔEPS is insignificant in both restricted and unrestricted regressions, ΔDPS is strongly significant in both. The restricted regression has already been reported in Table 5-12, Table 5-13 and Table 5-14. The ΔDPS coefficient in the early subsample in Table 5-15 indicates that a unit change this variable relates to a 2.29 percent change in the dependent variable CAR3Day (p = 0.0075), while the ΔEPS coefficient, also strongly significant, shows a much smaller association — less than one third of this magnitude. These first-order results on the early subsample are corroborated by a strongly significant first-order F-statistic (F = 7.95, p = 0.0004), which allows us to reject the null hypothesis H_{04} on this subsample.

Table 5-15: Restricted Least Squares Regression with Dummy Variables.

Regressand	CAR3Day		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)			
DD-ED (INTERCEPT)	-0.0190 (0.0006)	-0.0248 (0.0082)	-0.0108 (0.1109)
ΔEPS	0.0007 (0.4523)	0.0065 (0.0069)	0.0000 (0.9766)
ΔDPS	0.0125 (0.0074)	0.0229 (0.0075)	0.0076 (0.1634)
DI_EI	0.0329 (0.0001)	0.0299 (0.0301)	0.0270 (0.0106)
DD-EI	0.0133 (0.2569)	0.0312 (0.0696)	-0.0085 (0.5946)
DI-ED	0.0239 (0.0253)	0.0250 (0.1073)	0.0224 (0.1394)
DNC-EI	0.0195 (0.0136)	0.0174 (0.1535)	0.0181 (0.0869)
DNC-ED	0.0088 (0.2266)	0.0036 (0.7567)	0.0109 (0.2317)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)			
N	865	441	424
Adj $R^2_{UNRESTRICTED}$	0.0703	0.1267	0.0385
Adj $R^2_{EQUATION\ (ii)}$	0.0550	0.1172	0.0301
Adj $R^2_{EQUATION\ (iii)}$	0.0629	0.0987	0.0384
$F_{UNRESTRRICTED}$	10.3320 (0.0000)	10.1170 (0.0000)	3.4169 (0.0015)
$F_{EQUATION\ (ii)}$	26.1390 (0.0000)	30.2120 (0.0000)	7.5538 (0.0006)
$F_{EQUATION\ (iii)}$	12.6060 (0.0000)	10.6380 (0.0000)	4.3786 (0.0007)
$F_{FIRST\ ORDER}$	4.4017 (0.0125)	7.9541 (0.0004)	1.0112 (0.3647)
$F_{INTERACTION}$	3.8381 (0.0019)	1.9456 (0.0857)	1.7357 (0.1252)

However, the early subsample does not furnish a significant interaction *F*-statistic ($F = 1.9456$, $p = 0.0857$) in spite of the unrestricted model's furnishing of a strongly significant DD-ED effect (measured by the intercept term) and a DI-EI effect that was significant at the five percent level of error. These are the two effects we would expect to have an impact on the regressand in accordance with Kane, Lee and Marcus (1984), Easton (1991) and Lonie, Abeyratna, Power and Sinclair (1996). However, with respect to the early subsample with its simple formulation of EPS, these effects are ruled out by the insignificant interaction *F*-statistic. On this basis, the null form of the hypothesis H_5 (shown in alternative form here) cannot be rejected on the early subsample.

H_{A5}: The six paired dividend-and-earnings combinations (DI-EI, DD-ED, DD-EI, DI-ED, DNC-EI and DNC-ED) modelled by five interaction dummy variables are jointly related to CARs generated during the three-day event window, by investor activity following joint announcements.

The late subsample furnishes an even less responsive level of association. Although the unrestricted model produces a strongly significant DI-EI (good-news) interaction effect, this is not corroborated by a significant interaction F-statistic. Here again, H_{05} cannot be rejected. Further, the total absence of any first-order coefficients of any significance means that the hypothesis, H_{04} pertaining to the joint significance of first-order variables also cannot be rejected. There just does not appear to be any evidence of an investor reaction to a dividend signal (or any signal) present.

However, when the two subsamples are merged in column one, the 865 observations of the full sample do produce both a significant first-order effect and also a significant interaction effect, which allows us to reject both H_{04} and H_{05}. Here, the first-order ΔDPS effect, implying a 1.25 percent rise in CAR3Day per unit change in itself, is much stronger than the statistically insignificant first-order ΔEPS effect; and the DD-ED (bad news) and DI-EI (good news) interaction effects have the correct signs and are both strongly significant — along with two of the mixed news interaction effects albeit at only the five percent level of error.

The explanation for the statistically significant output generated by these mixed-message earnings-and-dividend direction variables is less intuitively obvious, but the background to it has already been laid in the discussion of ARs and three-day CARs in Sections 5.2 and 5.3. A unit change in the DNC-EI combination generated a positive 1.95 percent change in CAR3Day ($p = 0.0136$) because investors have reacted positively to the earnings-rise component in the sample's mid-year announcements. It is to be noted, however, that the t-tests of DNC-EI event-window CARs yielded test values that were insignificant, while those of the DNC-ED category were significant in the Sections 5.2 and 5.3 t-test results, but cease to be so here.

With respect to other mixed message categories, a unit change in the DI-ED combination generated a positive 2.39 percent change in CAR3Day ($p = 0.0253$). No clear reasoning can be applied to this finding as yet; but an interesting pattern relating to it will be discussed in Appendix G with respect to differences in CAR and interaction variable output characteristics between mid-year and year-end announcements.

These full-sample results indicate that the percentage change variables (ΔEPS and ΔDPS) jointly have a significant relationship with CAR3Day, and that the dividend-and-earnings direction combinations as a group enjoy an even stronger relationship with it. In other words, the market is influenced by the interaction effects between dividends and earnings when announced jointly — as they generally are in New Zealand.

The results reported in Table 5-15 are similar to, and in several respects, different from the results reported in earlier studies employing the same RLS technique, the significance levels of which are summarized in Table 5-16. The dividend and earnings interaction dummy variables in the full sample achieved levels of significance loosely similar to those observed by Kane, Lee and Marcus (1984) on their American data set of 352 observations. In that study, five of the combinations were significant at the one percent level of error. Their only combination failing to attain significance was *I*(+ -), which is called DD-EI in the current study.

Table 5-16: Comparison of Significance Levels of RLS Output over Four Studies.

	Kane et al (1984)	**Easton (1991)**	**Lonie et al (1996)**	**Current (Full Sample)**	**Current (Early Subsample)**	**Current (Late Subsample)**
ΔEPS	1%#	-	5%	-	1%	-
ΔDPS	1%#	-	-	1%	1%	-
DD-ED*	1%	5%	-	1%	1%#	-
DI-EI	1%	5%	5%	1%	5%#	5%#
DD-EI	-	-	-	-	-	-
DI-ED	-	-	5%	5%	-	-
DNC-EI	1%	5%	5%	5%	-	-
DNC-ED	1%	-	5%	-	-	-
First-order F	-	-	5%	5%	1%	-
Interaction F	5%	1%	5%	1%	-	-
Adjusted R^2 **	0.144	0.052	0.077	0.070	0.127	0.039

* DD-ED was modeled by the intercept in all studies

** This is the adjusted R^2 for the unrestricted equation. Easton (1991) reports only an R^2, which is reproduced here.
The stated percentages give the benchmark probability of a Type 1 error reported as not having been exceeded.
Statistic not validated by a significant first-order or interaction *F*-statistic

With respect to the first-order variables containing quantitative dividend information and quantitative earnings information, Kane et al reported a strongly significant 'dividend surprise' effect (the equivalent of the current study's ΔDPS). However, Kane et al found their 'earnings surprise' variable to be strongly significant. This fails to correspond with any equivalent effect in the full sample or late subsample in the current study, but strongly coincides with the finding on the early subsample. On the other hand, the 1984 study produced an insignificant first-order *F*-statistic, while the current New Zealand results furnished a first-order *F*-statistic significant with a five percent level of error. These two differences, qualitatively speaking, would tend to cancel each other out. Both studies place emphasis on the importance of the role of the interaction effects in place of the stand-alone effects of the first-order variables.

It is not feasible to compare the percentage change in the dependent CAR variable across Kane et al's and the current study as their definition of a joint announcement allowed for temporal proximity rather in addition to simultaneity, and their CAR was generated over a period of 21 days. It is of note that Kane et al did not report the behaviour of CARs outside their test period, whereas the current study does furnish this context.

Easton (1991), using 789 Australian industrial firm announcement observations which, unlike Kane et al's, were simultaneously joint dividend and earnings disclosures, also produced broadly similar results with points of difference. Easton's first-order variables, like Kane et al's, lapsed into insignificance in the output of his unrestricted equation, while in the current study, ΔDPS continued to be significant with less than a one percent error in the full sample and early subsample. Like, Kane et al, Easton produced a first-order F-statistic which was insignificant. This agrees with the current study's finding with respect to the late subsample. However, the first-order F-statistic is significant at the five percent level in the full sample and at the one percent level in the early subsample. With respect to his dummy variables, Easton produced only three significant interaction effects — all within the five percent error benchmark. These were for $I(+\ +)$, $I(-\ -)$ and $I(+\ 0)$, which correspond with DI-EI, DD-ED and DNC-EI in the current study. The current study found significant DI-EI interactions in all three sets of results (significant at the one percent level in the full sample at five percent in the two subsamples). The current study's DD-ED significance levels were tighter at the one percent level than Easton's in two out of three instances; but in the third (late subsample) this item lapsed into insignificance. The current study's full sample furnished a DNC-EI interaction with a five percent level of significance like Easton's. However, in the current study, the DI-ED interaction effect was also significant. Easton, like the current study's full sample, produced an interaction F-statistic that was significant at the one percent level of error.

The third study employing RLS regression was Lonie, Abeyratna, Power and Sinclair (1996) on 617 British joint announcement observations, which were simultaneous as in Easton (1991) and in the current study. Lonie et al produced both first-order and interaction F-statistics significant at the five percent level. The finding that both RLS combinative F-statistics were significant was something that set Lonie et al and the current study's full sample apart from Easton (1991) and Kane et al. However, while according with the current study's full sample output, Lonie et al's first-order F-statistic's significance was based on the performance of their first-order variable, 'earnings change' (ΔEPS in the current study) which was significant at the five percent level in their unrestricted regression, while their 'dividend change' variable lapsed into insignificance. In the full sample current study, it was ΔDPS which was significant and ΔEPS which was insignificant. However, the current study's early subsample finds both first-order variables strongly significant while the late subsample finds neither significant at all.

The most interesting aspect of the British findings was that the DD-ED interaction effect modeled in their unrestricted regression's constant term was not significant while it was strongly significant in both the US study and in two of the three outputs of the current study. More generally, with respect to Table 5-16, the current study and its three predecessors produce only three results in common agreement. The first two are a significant DI-EI interaction effect and a significant interaction *F*-statistic (on the full sample). The third is a little more intriguing — a significant DNC-EI interaction effect (again apparent in the current study's full sample) in conjunction with an absence of any significant DD-EI effect. In all studies the DNC-EI coefficient was positive, indicating the superior impact of a rise in announced earnings over a stasis in notified dividends, while news of a lowering of the dividend quite evidently cancelled this impact out in the DD-EI case. Nevertheless all studies still reported positive DD-EI coefficients.

One further item is of interest with respect to the results tabled from Table 5-12 to Table 5-15 in this subsection. This is the behaviour of the adjusted R^2 statistics. These are summarized in Table 5-17. With respect to the full sample, the rise in the adjusted R^2 is monotonic as the regressions become more all-encompassing. This trend is also evident with respect to the early subsample with one lapse from monotonicity; but the late subsample adjusted R^2 statistics peak in the second-to-last row where dummies are provided (as reported in Table 5-14) for the direction of dividend changes only.

Table 5-17: Summary of Adjusted R^2 statistics.

Regression Procedure	**Full Sample**	**Early subsample**	**Late subsample**
ΔEPS only	0.0091	0.0557	0.0005
ΔDPS only	0.0544	0.0917	0.0322
ΔDPS & ΔEPS	0.0550	0.1172	0.0301
ΔDPS & ΔEPS & One Earnings Dummy	0.0661	0.1255	0.0335
ΔDPS & ΔEPS & Two Dividend Dummies	0.0693	0.1228	0.0440
ΔDPS & ΔEPS & Five Dummies	0.0703	0.1267	0.0385

The bottom row can be directly compared with that of Table 5-16 which has the adjusted R^2 figures for Kane et al, Easton, and Lonie et al. It shows that the New Zealand results have roughly the same explanatory power as the British and Australian R^2s. Quite frankly they are all tiny. It would seem that none of the study RLS regressions can conclusively demonstrate a close linkage between event window CARs and the first-order and dummy variables employed in terms of variance or, as measured by their coefficients, in terms of magnitudes.

In summary, the record for the event window three-day cumulative abnormal returns (CAR3Day) is as follows: The variable, percentage change in earnings per share (ΔEPS) is significant on the full sample and early subsample when employed alone as the independent variable in a simple regression and retains this significance in all of the restricted least squares regression procedures on the early subsample (all observations form the start of the decade through to May 8th "1996). By contrast, it is never significant with respect to reported estimations on the late subsample (all observations from May 13th 1996 to the end of the decade).

The variable, percentage change in dividend per share (ΔDPS) is significant in all of the regression procedures recorded in this subsection with respect to the early subsample, but lapses into insignificance with respect to the five-dummy RLS regression on late subsample. With respect to the five-dummy procedures, the good news dummy variable (DI-EI) consistently furnished statistically significant relationships with the event window variable cumulative abnormal return variable, CAR3Day on both time-related subsamples — but this was not corroborated by the interaction F-statistic furnished in either the early or the late subsample. This also means that the strongly significant DD-ED effect in the early subsample's unrestricted equation was also disqualified.

However, with respect to the full sample, both first-order and interaction effects are found to be valid. In this set of results, ΔEPS remains insignificant, while ΔDPS is strongly significant, as are both the good-news and bad-news interaction effects. The fly in the ointment with respect to these results is that the EPS variable used in the creation of the ΔEPS variable changes its nature as of May 8th 1996, midway through the decade — thus rendering the result potentially dubious. However, in section 5.5, a test in the nature of a Chow test shows that the configuration of EPS did not unduly influence these results.

5.5 An Experiment concerning the Role of EPS

Throughout this chapter three sets of regression results have been reported and in these the early subsample results (based on a simple EPS formulation) differ substantially from the late subsample results (based on EPS information that was disclosed from May 13th 1996 onward). We might wonder why these results should be so dissimilar. Further we might wonder why the late subsample provides much less evidence of any significant association with the abnormal returns of the event window — especially given the fact that investors no longer needed to generate their own EPS information. Could it possibly be that investors do not actually use the provided EPS information, but base their perception of company profitability on something else?

In this section I do two things. First I perform an RLS regression procedure which performs the same function as a Chow test.[156] Second, I re-estimate the RLS regression with five dummies on a data set which has had the EPS component recalculated for all observations of ΔEPS such that it is based on net profit after tax and before extraordinaries divided by the number of ordinary shares outstanding on day t_{-2}.[157] This means that a consistent formulation of EPS is being employed across both time-based subsamples.

The equivalent to the Chow test is reported in Table 5-18.

The absence of a significant interaction F-statistic indicates that the change in configuration of the EPS variable does not make an appreciable difference to the results. The procedure was estimated for both a three-day event window and a single day event window. In addition, since distinctions between mid-year and year-end announcements are examined in Appendix G, the test has been performed on these subsamples as well. But the interaction F-statistic remained insignificant.

The results pertaining to re-estimated EPS inputs are reported in Table 5-19. (These are to be compared with those reported in Table 5-15 on page 142.) The first noteworthy item is that ΔEPS has become significant at the one percent level of error in the late subsample along with retaining its significance in the early subsample. (The full sample being a combination of the two, naturally furnishes a strongly significant ΔEPS also.) However, ΔDPS remains significant only in the early subsample and full sample cases. Nevertheless, all three cases furnish strongly significant corroborative first-order F-statistics.

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[156] The RLS procedure is recommended as superior to the Chow test by Gujurati, p. 265 at the end of his description of the Chow test.

[157] This formulation was not used in the rest of the study, as EPS data was calculated very early when information on daily shares outstanding was not available, and IRG annual summary data had to be used instead. However, the new results on the early data subsample should be very little different from the previously obtained results.

Table 5-18: RLS for Change in Way Announcements were made in the Early Part of the Decade compared with the Late.

Regressand	CAR3Day			ARt_0		
	All Obs.	Mid Year	End of Year	All Obs.	Mid Year	End of Year
Coefficient (p-Values)						
Intercept	-0.006037 (0.0612)	-0.013311 (0.0016)	-0.000238 (0.9600)	-0.002085 (0.4075)	-0.00772 (0.0133)	0.0026648 (0.4876)
ΔEPS	0.0025813 (0.0026)	0.0016459 (0.0491)	0.0084169 (0.0004)	0.0017367 (0.0094)	0.00126 (0.0424)	0.0047515 (0.0139)
Late dummy	0.0083063 (0.0711)	0.0034736 (0.5722)	0.012023 (0.0695)	0.0015734 (0.6613)	-0.001317 (0.7729)	0.0034807 (0.5155)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)						
N	865	397	468	865	397	468
Adj $R^2_{UNRESTRICTED}$	0.0117	0.0056	0.0270	0.0057	0.0056	0.0092
Adj $R^2_{EQUATION\ (ii)}$	0.0091	0.0073	0.0222	0.0066	0.0079	0.0104
Adj $R^2_{EQUATION\ (iii)}$	0.0023	-0.0017	0.0029	-0.0010	-0.0023	-0.0017
$F_{UNRESTRRICTED}$	6.0943 (0.0024)	2.1098 (0.1226)	7.4805 (0.0006)	3.4641 (0.0317)	2.1137 (0.1222)	3.1591 (0.0434)
$F_{EQUATION\ (ii)}$	8.8993 (0.0029)	3.9068 (0.0488)	11.592 (0.0007)	6.74E+00 (0.0096)	4.15E+00 (0.0422)	5.90E+00 (0.0155)
$F_{EQUATION\ (iii)}$	3.0209 (0.0826)	0.32223 (0.5706)	2.3572 (0.1254)	0.14764 (0.7009)	0.080158 (0.7772)	0.2129 (0.6447)
$F_{FIRST\ ORDER}$	9.1355 (0.0026)	3.8901 (0.0493)	12.5521 (0.0004)	6.7854 (0.0093)	4.1478 (0.0424)	6.1062 (0.0138)
$F_{INTERACTION}$	3.2642 (0.0712)	0.2951 (0.5873)	3.3105 (0.0695)	0.1795 (0.6719)	0.0829 (0.7736)	0.4211 (0.5167)

But, as before it is only the early subsample and not the late subsample which reports significant dividend-and-earnings interaction effects. However, with the improvement in the timeliness of share outstanding information used in computing the simple EPS, both the early subsample and the full sample now report significant interaction *F*-statistics. But the late subsample's interaction *F*-statistic (p = 0.0689) quite narrowly misses out on being significant at the five percent level of error. The early and late subsamples now have a strong DI-EI effect in common while only the early subsample also finds a strong DD-ED effect with the appropriate negative sign.

This revamped result quite strongly suggests that investors do react to earnings information, but not necessarily in terms of the EPS information actually provided in the announcement disclosures. Perhaps instead they may use some more general measure of profitability. But in addition the result hints at a time-based change in how investors react to the dividend component in New Zealand mid-year and year-end announcements. There appears to be a falling off of reactivity to the putative dividend signal in these announcements in the second half of the decade.

Table 5-19: RLS for CAR3Day with Alternative Formulation of EPS.

Regressand	CAR3Day		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)			
DD-ED (INTERCEPT)	-0.0188 (0.0006)	-0.0277 (0.0029)	-0.0107 (0.1116)
ΔEPS	0.0013 (0.0000)	0.0012 (0.0057)	0.0015 (0.0006)
ΔDPS	0.0126 (0.0056)	0.0242 (0.0045)	0.0070 (0.1825)
DI_EI	0.0321 (0.0001)	0.0360 (0.0079)	0.0260 (0.0125)
DD-EI	0.0090 (0.4383)	0.0380 (0.0248)	-0.0190 (0.2366)
DI-ED	0.0237 (0.0251)	0.0261 (0.0923)	0.0229 (0.1245)
DNC-EI	0.0175 (0.0249)	0.0208 (0.0824)	0.0169 (0.1058)
DNC-ED	0.0089 (0.2145)	0.0047 (0.6859)	0.0117 (0.1929)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)			
N	865	441	424
Adj $R^2_{UNRESTRICTED}$	0.0883	0.1274	0.0651
Adj $R^2_{EQUATION\ (ii)}$	0.0743	0.1081	0.0532
Adj $R^2_{EQUATION\ (iii)}$	0.0629	0.0987	0.0384
$F_{UNRESTRRICTED}$	12.9560 (0.0000)	10.1760 (0.0000)	5.2055 (0.0000)
$F_{EQUATION\ (ii)}$	35.6560 (0.0000)	27.6510 (0.0000)	12.8950 (0.0000)
$F_{EQUATION\ (iii)}$	12.6060 (0.0000)	10.6380 (0.0000)	4.3786 (0.0007)
$F_{FIRST\ ORDER}$	12.9553 (0.0000)	8.1393 (0.0003)	6.9641 (0.0011)
$F_{INTERACTION}$	3.6574 (0.0028)	2.9386 (0.0127)	2.0642 (0.0689)

Further, the result tabled in this section lends some support to the accuracy of the full sample results reported throughout the chapter. While they are based on a schizophrenic EPS formulation (i.e. pre- and post May 13th 1996), they agree with the Table 5-19 full sample result based on a consistent recalculated EPS for all observations.

Table 5-20: RLS for ARt_0 with Alternative Formulation of EPS.

Regressand	ARt_0		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)			
DD-ED (INTERCEPT)	-0.0124 (0.0040)	-0.0068 (0.3003)	-0.0141 (0.0152)
ΔEPS	0.0011 (0.0000)	0.0010 (0.0009)	0.0012 (0.0010)
ΔDPS	0.0112 (0.0017)	0.0239 (0.0001)	0.0053 (0.2400)
DI_EI	0.0204 (0.0014)	0.0097 (0.3140)	0.0238 (0.0083)
DD-EI	0.0061 (0.5056)	0.0168 (0.1638)	-0.0068 (0.6220)
DI-ED	0.0114 (0.1665)	-0.0002 (0.9866)	0.0196 (0.1303)
DNC-EI	0.0117 (0.0554)	0.0020 (0.8158)	0.0190 (0.0356)
DNC-ED	0.0069 (0.2203)	-0.0055 (0.5048)	0.0144 (0.0640)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)			
N	865	441	424
Adj $R^2_{UNRESTRICTED}$	0.0813	0.1180	0.0594
Adj $R^2_{EQUATION (ii)}$	0.0743	0.1137	0.0490
Adj $R^2_{EQUATION (iii)}$	0.0499	0.0659	0.0356
$F_{UNRESTRRICTED}$	11.9210 (0.0000)	9.4071 (0.0000)	4.8168 (0.0000)
$F_{EQUATION (ii)}$	35.6870 (0.0000)	29.2290 (0.0000)	11.9080 (0.0000)
$F_{EQUATION (iii)}$	10.0740 (0.0000)	7.2065 (0.0000)	4.1246 (0.0011)
$F_{FIRST\ ORDER}$	15.6790 (0.0000)	13.8542 (0.0000)	6.2871 (0.0020)
$F_{INTERACTION}$	2.3081 (0.0426)	1.4221 (0.2150)	1.9334 (0.0877)

I would now like to narrow the event window to one day and report how the experiment worked in that context. Table 5-20 is the one-day event window equivalent of Table 5-19. Its salient feature is that the first-order *F*-statistics are strongly significant for all three time-based cases, while the interaction *F*-statistic for the early subset lapses into insignificance — although the late subsample has an interaction *F*-statistic *p*-value which falls not far short of significance at the five percent level of error. However, given that the compilation of EPS information is consistent across both subsamples, the significant interaction *F*-statistic for the full sample can be accepted at face value. The two interaction effects that attain significance are the DD-ED and DI-EI interaction effects as posited by Kane, Lee and Marcus (1984), Easton (1991) and Lonie, Abeyratna, Power and Sinclair (1996). This does appear to support the contention that a dividend signal is being acted upon by investors.

5.5.1 The Shift to a 948-event Data Set

The RLS regressions performed so far in this chapter were performed in a format that would be directly comparable to those of Lonie, Abeyratna, Power and Sinclair (1996). This entailed the configuration of the percentage change in dividend variable from the equivalent dividend announced the previous year. The formula employed for calculating percentage change in dividend was[158]:

$$\Delta DPS = \frac{DPS_t - DPS_{t-1}}{DPS_{t-1}} \tag{5.5}$$

There were several disadvantages in this measure. As a percentage measure it related only to dividends and nothing else, which made it somewhat esoteric relative to what investors might take into account when framing an investment decision. For instance it does not take into account the existing value of the underlying share. Consider, for instance, a one-cent increase from last year's ten-cent dividend. This is a 10 percent increase. Now, let the current price of the underlying share be either \$1 or \$10. If it is \$10, the "10 percent" increase afforded by one-cent change in dividend looks much less of a bonanza than if the share were currently to have been trading at \$1.

In addition, a dividend initiation or resumption following a year or more of no dividends at all could not be included in the sample unless it was assigned an arbitrary value — such as 1,000% increase.[159] This was because if the announced dividend from the previous year (DPS_{t-1}) was zero, then ΔDPS was undefined. Any chosen arbitrary value, if set high enough to be greater than actual recorded percentage changes in dividend would be so high that it would distort the regression results in the manner of an over-emphasised outlier. Any lesser assigned value would be indefensible on the ground that it was surpassed by mere changes as distinct from initiations. The solution chosen for this conundrum was the dropping of dividend initiations and resumptions from the sample, thereby reducing the dataset from 948 to 865 event-observations.

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[158] The *t*-subscripts in this formula relate to years. A change in midyear dividend was measured from this year's and last year's midyear figures; and a change in year-end dividend was produced from year-end figures.

[159] Given that most dividends in New Zealand in the 1990s were between 5 and 15 cents in magnitude, and increase of 10 cents from the former to the latter is a 300% increase. An increase of 13 cents from 2 cents to 15 cents is a 750% increase.

An alternative configuration which gets around both the implausible framing disadvantage and the arbitrary value assignment disadvantage is:

$$\Delta DPS = \frac{DPS_{THIS\ YEAR} - DPS_{LAST\ YEAR}}{P_{t-1}} \tag{5.6}$$

Here the denominator is the adjusted closing price on the day before the joint dividend and earnings announcement. If last year's dividend is an investor's expectation of this year's dividend, the formulation can be easily interpreted as the unexpected change in dividend yield based on the most recent available price. And, given that P_{t-1} is never zero, the formulation never produces undefined results. Hence the original dataset of 948 observations can be employed in the RLS procedure. Further, the new configuration is intuitively attractive because it computes a dividend change from the elements which are most immediately available for such a computation — and therefore likely to be used as a heuristic.

When all 948 observations are used, the pattern of significant first-order variables and significant interaction dummies is consistent with the results reported on the 865-observation dataset in Table 5-15 on page 142 with the small exception that in the equation restricted to first-order variables only, ΔEPS becomes significant at the 5% level where before it was insignificant. This has the effect of making the first-order F-stat significant at the 1% level of a Type 1 error. This is reported in the first column of Table 5-24 on page 157 in the next section. The table is placed there because it specifically addresses the phenomenon of thin trading, which is now about to be discussed.

5.6 Effect of thin Trading on Market Model Calculations and RLS Output

5.6.1 Preliminary Comments

The earlier studies, Kane, Lee and Marcus (1984), Easton (1991) and Lonie et al (1996) did not consider the effects of thinly-traded markets. Therefore an immediate question one might ask is whether adjusting for thin trading might change our ability to detect a dividend signal. In addition, there is a methodological question. The methodology of Market Model estimation and the associated RLS regression rely on the assumption that the data is normally distributed. Furthermore, they require that the regression errors follow a normal distribution.

Hence at this point, an initial focus of interest becomes whether or not any immediate connection can be drawn between the incidence of thin trading and the incidence of non-normality. A second question is, what effect was discernible on dividend signalling when an RLS regression was applied to observations partitioned on the basis of trading thinness? I consider the incidence of non-normality first in Subsections 5.6.2 and 5.6.3. The effect of partitioning is then considered in Subsections 5.6.4 and 5.6.5. Subsection 5.6.6 then considers the incidence and effect of inclusion in the study of announcement events where the company's shares failed to trade at all in the event window.

5.6.2 Cross-sectional Characteristics of ARs estimated on the Test Period

In the second calculation of Market Model methodology, the expected return computed on each stock's 100-day estimation period is subtracted from the actual log returns collected for each stock on each day of the 21-day test period to furnish a daily abnormal return (AR). Since there were 948 event observations, we now have 948 sets of test period ARs.

But can we trust the ARs? Are they biased, given that the population of betas generated by the Market Model appear to be biased? Brown and Warner (1985) tested the properties of the Market Model with respect to 250 portfolios (each containing 50 randomly selected shares) from the CRSP database with an 11-day test period containing an artificial event window AR. Their dataset allowed for the inclusion of shares that had as few as 30 actual returns available in the preceding 239-day estimation period. Brown and Warner argued that the resulting set of ARs should not be biased as, by construction, the respective biases of the collected alphas and betas would cancel each other out in the expected returns calculation.[160]

Table 5-21: Normality Tests on RLS Regression Dependent Variables CAR3Day and ARt_0.

Jarque-Bera Test				
	H	p-Value	STAT	$CV_{5\%}$
CAR3Day	1	0	3259.7	5.9915
ARt_0	1	0	11990	5.9915
Lilliefors Test				
CAR3Day	1	NaN	0.1101	0.028776
ARt_0	1	NaN	0.1562	0.028776
Kurtosis and Skewness				
	Kurtosis		Skewness	
CAR3Day	12.065		-0.45149	
ARt_0	20.329		-1.0885	

Normality tests on the day zero abnormal return, ARt_0, and the three-day CAR, CAR3Day are presented in Table 5-21. It is clear that the biases of the alphas and betas did not cancel each

[160] Brown and Warner (1985), p. 16.

other out. In addition, the test values furnished by CAR3Day are more extreme than are ARt_0 test values, implying they diverge even further from normality.

5.6.3 Characteristics of the Residuals from the RLS Regression on Event Window Data

The RLS procedure entailed the three linked regressions, as used earlier in this chapter. Table 5-22 shows that the distributions of the RLS residuals in all three estimations, with respect to a three-day event window and the model including the full five dummies, are far from normal.

Table 5-22: Normality Tests on Residuals of RLS Regression (Regressand = CAR3Day).

Jarque-Bera	**Unrestricted**	**EQN (ii)**	**EQN (iii)**
Non Normality (H)	1	1	1
p-value	0	0	0
$CV_{5\%}$	5.9915	5.9915	5.9915
Test Stat	3215.8	3191.3	3293.5
Lilliefors	**Unrestricted**	**EQN (ii)**	**EQN (iii)**
Non Normality (H)	1	1	1
p-value	NaN	NaN	NaN
$CV_{5\%}$	0.028776	0.028776	0.028776
Test Stat	0.090978	0.10514	0.095607
	Unrestricted	**EQN (ii)**	**EQN (iii)**
Kurtosis	11.9880	11.9360	12.1240
Skewness	-0.5205	-0.5904	-0.3860

5.6.4 The Effect of Partitioning the Data Sets into Bands or Portfolios

When the 100-day estimation sets were separated into bands by the number of days on which trading actually occurred, there was some change in the incidence of non-normality on the residuals — with respect to the Jarque-Bera and Lilliefors results. Table 5-23 shows that where estimation sets contained at least 80 days of actual trading, the incidence of normally distributed residuals did actually rise; but this rise certainly did not swamp out the preponderance of the non-normal ones. However, as the number of actual trading days approached the full 100, non-normality did indeed trend downward. This is visible towards the bottom of the table where the top 20% band was split into two narrower bands, and then the 100% group recorded in isolation.

The other noteworthy feature in Table 5-23 is that, as more and more of the 100 available days become days of actual trading, the mean kurtosis monotonically reduces from 38.88 to a minimum (for 100-day traders) of 5.56. While this is still far from the kurtosis value for a normal distribution, it is a big drop. There is no similar trend in the skewness figures. There are 16,924 zero-value returns out of the 94,800 returns in the estimation sets, and these amount to 17.85% of the total. This figure will decrease only slightly if estimation sets containing less than 40 days of actual trading are removed from the study.

Table 5-23: Normality Tests on 100-Day Estimation Set Residuals sorted into Twenty-day Bands.

Days Traded		Normality Tests			
Band	Count	Jarque-Bera	Lilliefors	Kurtosis	Skewness
0-19	21	100% (21)	100% (21)	38.88	-1.0360
20-39	61	100% (61)	100% (61)	20.57	0.2922
40-59	80	100% (80)	100% (80)	14.32	-0.0975
60-79	130	98% (127)	99% (129)	8.84	0.4129
80-100	656	69% (452)	75% (494)	6.13	0.2423
80-89	117	83% (97)	94% (110)	7.56	0.2218
90-100	539	66% (355)	71% (384)	5.82	0.2467
100	211	58% (122)	53% (111)	5.56	0.2644
All	948	78% (741)	83% (785)	8.847026	0.2119138

5.6.5 RLS Results and the characteristics of their Residuals

Table 5-24 contains the RLS regression results for 948 sets of RLS regressions using CAR3Day as the dependent variable and with the two first-order variables reconfigured to measure the dollar change as a percentage of the most recent closing price (day t_{-1}). None of the lower four bands return any significant evidence of an investor reaction to a dividend signal, or for that matter, any earnings signal either. However, the 648 observations in the top band utilising Market Model estimation sets where there were at least 81 days of actual trading did furnish evidence supporting a strongly significant interaction effect. Both the good-news and the bad-news combinations were significant at the one percent level, and only one mixed-news combination (DI-ED) registered as significant at the five percent level of error. Given that DI-ED furnished a positive coefficient, this evidence indicates that a discrete dividend signal might be present here for this particular subset of observations. The first-order variables themselves remained insignificant — which does not damage the finding that reaction to a dividend signal has been detected on the subset. The final column in Table 5-24 contains results for the entire dataset left unpartitioned, which (as before) leave the presence of a discernible dividend signal open to question because of the fog-creating significance of mixed-message coefficients. These results, so far, suggest that very thin trading does not pick up spurious instances of a response in log returns to a dividend or earnings signal.

Table 5-24: RLS Results on Thin Trading Subsamples partitioned by 20-day Bands

Regressand	CAR3Day					
Band	All Obs.	To 20 Days	21 to 40	41 to 60	61 to 80	81 Days Upward
Coefficients of Unrestricted Regression (p-Values)						
DD-ED (INTERCEPT)	-0.0168 (0.0032)	-0.0011 (0.9808)	-0.0366 (0.2086)	0.0003 (0.9881)	-0.0192 (0.2495)	-0.0211 (0.0020)
ΔEPS	0.0003 (0.4318)	-0.0036 (0.6096)	0.0007 (0.8533)	0.0052 (0.0236)	0.0010 (0.1117)	-0.0003 (0.4858)
ΔDPS	0.0021 (0.0002)	0.0041 (0.0348)	0.0017 (0.3234)	0.0017 (0.4172)	-0.0007 (0.7627)	0.0014 (0.1702)
DI-EI	0.0334 (0.0000)	0.0207 (0.7436)	0.0590 (0.1794)	0.0419 (0.2283)	0.0421 (0.0612)	0.0349 (0.0001)
DD-EI	0.0118 (0.3284)	[No Data]	0.1230 (0.2533)	0.0205 (0.6635)	-0.0017 (0.9571)	0.0086 (0.5129)
DI-ED	0.0222 (0.0201)	0.0051 (0.9463)	0.0257 (0.6687)	0.0103 (0.8010)	0.0308 (0.2522)	0.0271 (0.0146)
DNC-EI	0.0173 (0.0310)	0.0299 (0.5850)	0.0438 (0.4252)	0.0132 (0.6616)	0.0201 (0.4092)	0.0167 (0.0701)
DNC-ED	0.0068 (0.3504)	-0.0376 (0.5175)	0.0338 (0.4170)	0.0208 (0.5239)	0.0247 (0.2284)	0.0046 (0.5812)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)						
N	948	25	60	77	138	648
Adj $R^2_{\text{UNRESTRICTED}}$	0.0874	0.4139	0.1245	0.1847	0.0924	0.0711
Adj $R^2_{\text{EQUATION (ii)}}$	0.0624	0.3494	0.0798	0.1633	0.0630	0.0353
Adj $R^2_{\text{EQUATION (iii)}}$	0.0721	0.2304	0.1077	0.1126	0.0741	0.0682
$F_{\text{UNRESTRRICTED}}$	12.859 (0.0000)	2.1186 (0.1015)	1.0562 (0.4047)	2.2336 (0.0416)	1.8915 (0.0759)	7.0028 (0.0000)
$F_{\text{EQUATION (ii)}}$	31.4410 (0.0000)	5.9068 (0.0088)	2.4717 (0.0934)	7.2212 (0.0014)	4.5347 (0.0124)	11.8040 (0.0000)
$F_{\text{EQUATION (iii)}}$	14.6350 (0.0000)	1.4970 (0.2408)	1.3037 (0.2762)	1.8020 (0.1235)	2.1143 (0.0676)	9.3919 (0.0000)
$F_{\text{FIRST ORDER}}$	7.8772 (0.0004)	2.6613 (0.0987)	0.4979 (0.6107)	3.0516 (0.0537)	1.3100 (0.2734)	1.0162 (0.3626)
$F_{\text{INTERACTION}}$	5.1490 (0.0001)	0.3742 (0.8594)	0.5307 (0.7520)	0.3627 (0.8723)	0.8444 (0.5207)	4.9334 (0.0002)

5.6.5.1 Results by Quartile

In Table 5-25, the same datasets are repartitioned (as near as possible) into quartiles. It is of interest to see exactly how the quartiles fall in terms of days traded. The thinnest trader in the lower-mid quartile traded on 73 out 100 days, while the thinnest trader in the upper-mid quartile traded on 93 days out of 100 — or put the other way, failed to trade on only seven days. The top quartile consisted of only fully-traded stocks. This time around, none of the subsamples return significant results — not even the 211 observations furnished from fully-traded Market Model estimation sets.

The results imply that the mere absence of trading during the Market Model estimation phase is not sufficient to explain untrustworthy results. It is to be noted that even the most heavily-traded companies in the study tended to furnish distributions of log returns that were not normally distributed, and residuals that were likewise from some other distribution. (The incidence of non-normality by the Jarque-Bera test in Table 5-23 was 58% of these 211 firm/events.)

Table 5-25: RLS Results on Thin Trading Subsamples partitioned by (Rough) Quartiles.

Regressand	CAR3Day				
Quartile	All Obs.	To 72 Days	73 to 92 Days	93 to 99 Days	100 Days
Coefficients of Unrestricted Regression (p-Values)					
DD-ED (INTERCEPT)	-0.0168 (0.0032)	-0.0206 (0.1061)	-0.0110 (0.3991)	-0.0234 (0.0427)	-0.0195 (0.0259)
ΔEPS	0.0003 (0.4318)	0.0007 (0.4791)	0.0004 (0.4930)	0.0000 (0.9432)	0.0007 (0.4240)
ΔDPS	0.0021 (0.0002)	0.0019 (0.0255)	0.0027 (0.2212)	0.0010 (0.5089)	-0.0003 (0.8455)
DI-EI	0.0334 (0.0000)	0.0549 (0.0035)	0.0340 (0.0480)	0.0352 (0.0187)	0.0169 (0.1536)
DD-EI	0.0118 (0.3284)	0.0464 (0.1654)	0.0071 (0.7473)	0.0294 (0.2683)	-0.0214 (0.1868)
DI-ED	0.0222 (0.0201)	0.0221 (0.3352)	0.0439 (0.0334)	0.0146 (0.4224)	0.0257 (0.0909)
DNC-EI	0.0173 (0.0310)	0.0329 (0.0724)	0.0214 (0.2573)	0.0112 (0.4753)	0.0141 (0.2153)
DNC-ED	0.0068 (0.3504)	0.0189 (0.2642)	0.0009 (0.9542)	0.0009 (0.9487)	0.0148 (0.1645)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)					
N	948	241	236	260	211
Adj $R^2_{\text{UNRESTRICTED}}$	0.0874	0.1361	0.1158	0.0657	0.0533
Adj $R^2_{\text{EQUATION (ii)}}$	0.0624	0.0987	0.0764	0.0249	0.0180
Adj $R^2_{\text{EQUATION (iii)}}$	0.0721	0.1153	0.1047	0.0641	0.0503
$F_{\text{UNRESTRRICTED}}$	12.859 (0.0000)	5.2427 (0.0000)	4.2669 (0.0002)	2.5314 (0.0156)	1.6328 (0.1279)
$F_{\text{EQUATION (ii)}}$	31.4410 (0.0000)	13.0310 (0.0000)	9.6373 (0.0001)	3.2754 (0.0394)	1.9014 (0.1520)
$F_{\text{EQUATION (iii)}}$	14.6350 (0.0000)	6.1279 (0.0000)	5.3767 (0.0001)	3.4770 (0.0047)	2.1719 (0.0586)
$F_{\text{FIRST ORDER}}$	7.8772 (0.0004)	2.7916 (0.0634)	1.4419 (0.2386)	0.2260 (0.7978)	0.3214 (0.7255)
$F_{\text{INTERACTION}}$	5.1490 (0.0001)	2.0153 (0.0773)	2.0335 (0.0749)	2.2033 (0.0545)	1.5156 (0.1864)

5.6.6 Trading on the Day of the "Event"

Of the 948 event observations, 847 of them recorded trades on t_0, the day of the joint dividend and earnings announcement. A failure to trade on day t_0 should produce no evidence at all of a dividend signal with respect to that particular firm's dividend and earnings announcement. However, the Market Model methodology used so far in the study would create a spurious and potentially large AR that, in the RLS regression step, would be quite likely to furnish evidence of a signalling effect. The simple problem with this is that the evidence is entirely spurious.

There were 101 instances in which no trade occurred on Day t_0 and these amount to 10.65% of the entire sample. Interestingly, nine of these related to announcements of dividend initiations or resumptions. When the event window was re-expanded to include a day either side of t_0, measured by CAR3Day, 910 of the original 948 event observations furnished related trades; and the 38 non-traders amounted to 4.01% of the sample. But there were still four dividend initiating or resuming firms whose shares even now did not trade in the event window.[161] Obviously there was no dividend signal taken up by investors in those instances.

5.7 Chapter Summary

The chapter started with a perusal of the mean abnormal returns generated on a data set of 948 company observations which included 83 instances of dividend initiations and resumptions. The initial analytical tool was the *t*-test. It was found that the set, as a whole did not furnish significant ARs, but dividend increases and decreases (ignoring changes in earnings) did produce ARs that were significant with less than a one percent likelihood of a Type 1 error. The set of all announcements containing news of no change in an existing level of dividend did not produce a statistically significant mean AR. When the data set was reassembled into observations containing an earnings increase (ignoring changes in dividend) and then an earnings decrease, the mean ARs were again significant at the one percent level of error. The signs of all means were positive for increases, and negative for decreases.

With respect to three-day CARs spanning days t_{-1}, t_0 and t_1, the DI-EI set, containing increases only, furnished a strongly significant positive mean, while the DD-ED set, with dividend omissions retained in it, furnished a strongly significant negative mean AR. Three of the remaining four dividend-and-earnings groupings did not produce significant ARs (DD-EI, DI-ED and DNC-EI), but the final one, DNC-ED furnished a negative mean AR significant with less than a five percent level of error. This pattern was repeated, with one exception, when the ARs were coalesced into three-day CARs. The exception was that the DNC-ED mean CAR was more strongly significant at less than a one percent level of error. It would seem that the reduction in earnings was the influential factor here.

At this point, the data set was reduced to 865 to avoid an arbitrary value assignment problem associated with dividend initiations and resumptions, and to make the ensuing results comparable to those of Lonie et al in the United Kingdom. Then simple ordinary least squares regression and restricted least squares regressions procedures were employed in the data analysis. The

[161] In an extreme instance, the Radio Otago announcement of November 1991 had no history of associated trading over almost a nine-week period. The last prior trade was on day t_{-42}, and the next was on day t_1.

variable percentage change in EPS (ΔEPS) was found to be significant when used as the sole independent variable in the full sample (covering the full 1990s decade) and in the early subsample of observations (covering from 1990 through till May 8th 1996). However this significance lapsed in the late subsample of observations from May 13th 1996 to the end of the decade. ΔEPS retained its significant status when ΔDPS was added as an independent variable only in the early subsample. With respect to the early subsample only, ΔEPS continued to be significant in the unrestricted estimations when dummy variables were introduced to model the direction of change in earnings leaving direction of dividend change unmodeled, and the direction of change in dividend leaving direction of earnings change unmodeled. ΔEPS also remained significant with respect to the early subsample only, when the full five-dummy RLS regression procedure was employed. However, with respect to the late subsample, ΔEPS never achieves significance. In terms of the full sample, ΔEPS remains insignificant whenever ΔDPS is included in the same estimation.

I now turn to the first-order variable, ΔDPS. With respect to the early subsample and also the full sample, ΔDPS remained significant in every procedure, and in every instance for these two sets of observations, the first-order F-statistics were also significant. Therefore the joint impact of the two announcement components can be said to have a significant impact on the event window CAR variable. But this hold true only in terms of the full decade estimations and the early subsample estimations. Significance eludes it with respect to all but one of the late subsample estimations. Further, the first-order F-statistic remains insignificant in the full five-dummy RLS procedure for this subsample. Clearly, on the published data for the latter part of the decade there is no joint influence effect from announcements discernible in the behaviour of first-order coefficients on this dataset.

When a dummy variable was employed to represent all announcements containing an earnings increase and increases (ignoring change in dividends) with respect to the full sample, earnings decreases were found to be strongly significant in the full decade sample and in the early subsample but earnings remained insignificant in the late subsample.

With respect to the use of two dummy variables to represent direction of dividend change (ignoring earnings change), rising dividends and falling dividends furnished coefficients that were appropriately positive and negative. In the full sample the DI and DD interactions were significant and were validated by a significant interaction F-statistic. In the early subsample, DI lapsed into insignificance and so did the interaction F-statistic. In the late subsample, however, the DI effect was significant and the DD and dividend no-change category (DNC) remained insignificant, the DI interaction was validated by a significant F-statistic.

This schizophrenic behaviour remained apparent when the full restricted least squares procedure with five dummy variables representing the six dividend-and-earnings change permutations was employed. The full sample furnished strong support for the existence of a dividend signal that investors reacted to. In the full sample, the first-order variable, ΔDPS was strongly significant along with the coefficients for the DI-EI, DD-ED interactions. All of these were significant with less than a one percent level of error. However, two further interaction effects were significant (DI-ED and DNC-EI) at the five percent level of error. It was of interest that the DNC-EI category became significant, because it furnished no significant results in the *t*-testing phase covered in Sections 5.2 and 5.3. Furthermore, DNC-EI announcements produced significant event window CARs in all of the earlier American, Australian and British studies discussed in Section 5.4. Generally speaking, the results of all of the joint earnings and dividend signalling studies mentioned in Section 5.4 were broadly in agreement with the full sample result. All supported the contention that there is a joint dividend-and-earnings signal which systematically varies the message that investors apparently receive from it in accordance with the nature of the dividend-change and earnings-change mix.

But the entire story changed when focus shifted from the full sample to the late subsample of observations dating from May 13th 1996 onward. Nothing could be deemed significant as neither the first-order nor the interaction *F*-statistic achieved significance.

With respect to the early subsample, the main feature was that both of the first-order variables and the first-order *F*-statistic were significant, but the interaction effects were not. Hence, for the first half of the decade, given the configuration of the EPS variable, the dividend signal cannot actually be separated out from the earnings signal.

However, when an experiment was performed on the data set in which a simple formulation of EPS was recalculated for all announcement observations (irrespective of whether the announcement actually provided an EPS figure or not), the late subsample did show more responsiveness in three-day CARs to the dividend and earnings content of announcement data. This suggested that investors might use information other than the EPS figures actually provided to assess the profitability of the firm. In addition, however, the experiment also showed that there was less responsiveness to specific elements of announcement information in the second half of the decade.

In Subsection 5.6 it was shown that thin trading affects the computed results. Because there are a large number of zero daily company returns in the 100-day Market Model estimation period for many of the 948 company-events considered in this study, the observed share returns, R_{it} tend not to follow a normal distribution. This, in turn, undercuts the validity of OLS regression as the proper tool for estimating expected returns. However, the question as to what to do about it in the context of a regression-based methodology remains an open question. The record of prior research suggests that a few good diagnostic tests are in place, but that OLS regression outperforms most, if not all, of the improvements that have been proposed over time.

However, with respect to the thin trading phenomenon which will be one of ther most important themes of this thesis from this point onward, the sample will be divided into a subset containing company/event observations where the trading is 'fat,' and another subset in which the trading associated with the company/events is relatively thin. The thinly-traded subset is defined as containing all observations associated with firms whose shares failed to trade on at least one day in the 100-day estimation period for calculating expected returns. With respect to the fully-traded subset, firms' shares traded on all 100 days. (The term 'fully-traded' will be used in place of 'fat.') It will be observed that the fully-traded subset rarely furnishes significant results of an association between the independent variables (ΔDPS, ΔEPS and the five interaction dummy variables) and the event-window measures of abnormal returns (CAR3Day and ARt_0).

In Chapter 6 the first of two radical solutions to the zero-return econometric problem associated with thin trading is tabled. Chapter 6 is about friction models.

6 A Friction Model Solution to Diagnosis of Signalling in a Thin Market Environment

6.1 Chapter Introduction

In Chapter 2 Subsection 2.4, the concept of friction modelling was introduced and a background was provided. In this new chapter, the friction models used in the current study are developed and the results that have been obtained are tabled and explained. The chapter is laid out as follows:

In Section 6.2, the characteristics of the study's daily returns and regression residuals are tabled to show why a friction model employing Maximum Likelihood Estimation is a methodologically attractive alternative to the Market Model. Section 6.3 covers the methodology in more depth than has been provided so far, while Section 6.4 tables results at two levels of operation. The first of these involves the use of a friction model to obtain expected returns which take the influence of zero-value returns (and therefore thin trading) into account. These expected returns are then employed in the generation of ARs, which are fed into the standard restricted least squares (RLS) regression procedure for determining the presence or non-presence of an investor reaction associated with a purported dividend signal in the joint dividend-and-earnings announcement context. This material is covered in Subsections 6.4.1 and 6.4.1.1.

Then in Subsection 6.4.2, I move on to the second level, which concerns the use of friction modelling to account directly for what is observed in the event window of the event study. Initially a series of related models that replace regression procedures employing the first-order variables, ΔDPS and ΔEPS are explored. With respect to the most sophisticated of these friction models..

But so far, these models can be deemed to have only partially replaced the role of the standard RLS regression procedure used throughout this thesis. In Subsection 6.4.3 this issue is directly addressed with a friction model employing two interaction variables which have three levels apiece and which model the behaviour of four of the six dividend-and-earnings interaction effects. This is followed by the chapter's conclusion in Section 6.4.4.

6.2 Why a Regression-based Methodolgy should be replaced

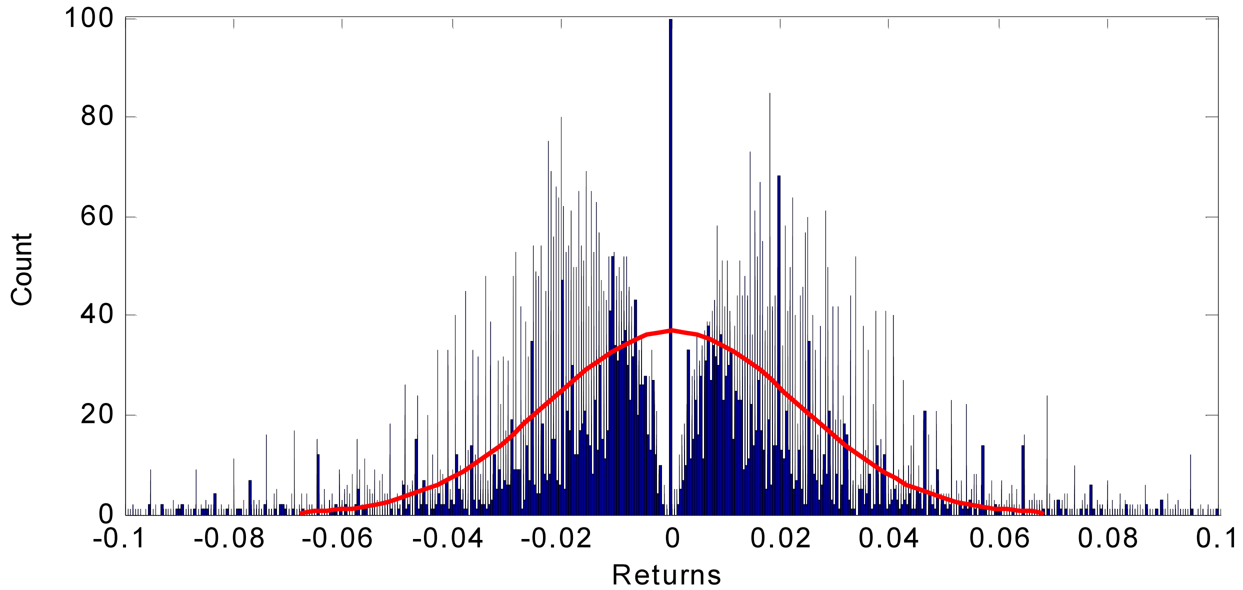
Because it employs OLS regression, the Market Model produces reliable results only if it is estimated on data that is linear in nature. In the context of 1990s New Zealand Stock Exchange data, it became clear that neither the input data nor the residuals associated with the final output follow a normal distribution.

6.2.1 Characteristics of Observed Daily Returns

Expected returns have been estimated with respect to the 100 days of stock returns immediately preceding the 21-day test period in which the three-day event window (days t_{-1}, t_0 and t_1) was embedded. The returns themselves were logarithmic on the ground that logarithmic returns were more likely to follow a normal distribution than would a simple ratio of closing price information. Indeed, if the Market Model is to be used with confidence, then the residuals of the OLS regression on the underlying estimation phase data should exhibit the properties of a normal distribution.

But even where a firm's shares were traded every day, neither the daily log returns nor the OLS-generated residuals turned out to be normally distributed. Figure 6-1 contains the pattern of returns visible when all 100 observations from all 948 company/event estimation periods were put into a histogram with the horizontal axis is restricted to –0.1 and +0.1. It was necessary to truncate the vertical axis at 100. This is a very artificial view because the free-standing spike at zero actually goes up to a count of 41,655.

Figure 6-1: Distribution of Log Returns with Both Axes and Zero-value Spike Truncated.



Effectively, the prevalence of zero-value returns drives the behaviour of the OLS regressions used in Market Model estimation in this study. Of interest is the absence of values that are close to zero — which causes the zero-return spike to rise from the bottom of a deep valley. This implies that the returns change in discrete steps relating to the price changes in dollars and cents on a share; and that there is a minimum step-size.

6.2.2 Characteristics of Residuals from the Market Model Estimation Sets

In Table 6-1, the incidence of non-normality with respect to the residuals of the 948 Market Model estimation datasets is only slightly lower than what was found in the previous subsection on the distributions of log returns. Jacque Bera and Lilliefors tests for normality were employed.

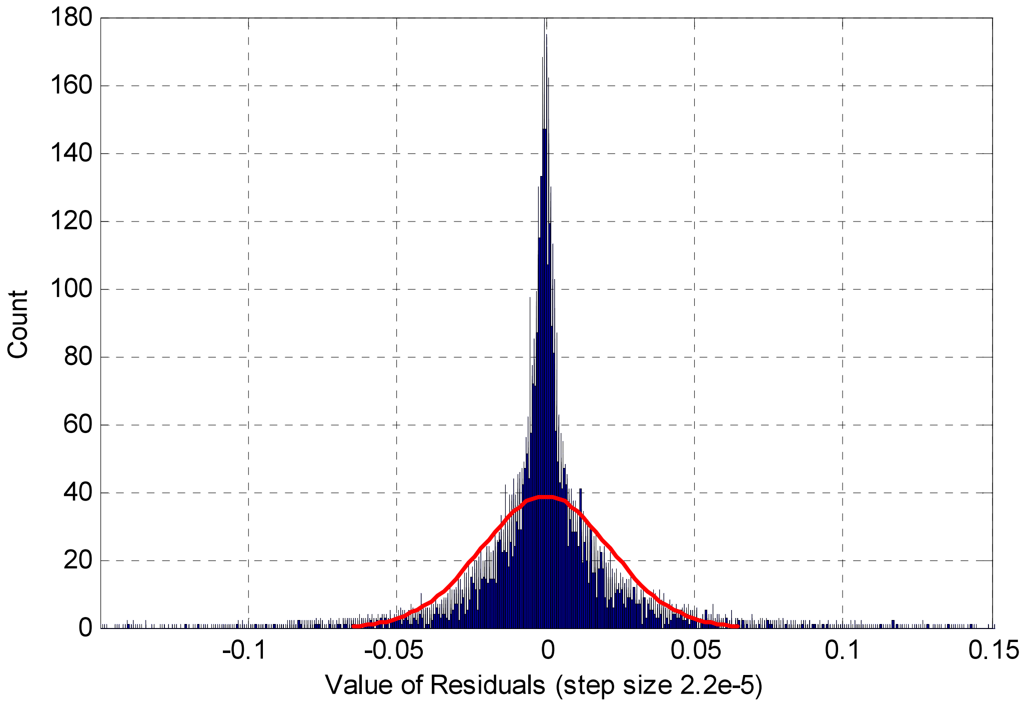
Table 6-1: Percentage (and Count) of Estimation Datasets with Non-normal Residuals

		Percentage (Count) Not Normal		Residuals	
Sample	**Total**	**Jarque Bera**	**Lilliefors**	**Kurtosis**	**Skewness**
DI-EI	311	77% (240)	81% (252)	8.7854	0.3253
DD-ED	182	81% (148)	89% (162)	9.6081	0.039632
DD-EI	38	84% (32)	82% (31)	7.8079	0.62034
DI-ED	80	80% (64)	84% (67)	8.9246	0.12481
DNC-EI	140	75% (105)	79% (111)	7.7693	0.20356
DNC-ED	197	77% (152)	82% (162)	9.176	0.15461

It is clear again here that non-normality is pervasive and independent of any ensuing announcement information. The average figures for the kurtosis and skewness of dividend and earnings-related subsets are included in the final two columns.

That we are dealing with a distribution that is other than normal is made graphically clear in Figure 6-2. The residuals conform to a distribution resembling a witch's hat with a very tall peak and a very wide brim. The horizontal axis has been trimmed to between –0.1 and +0.1, which has excluded a few extreme outliers; and a normal distribution curve has been superimposed.

Figure 6-2: Histogram of 94,800 Residuals from 948 Estimations with Horizontal Axis Truncated.



It is clear that these residuals are not normally distributed. On the one hand, outliers are present which bring about the fatness of the tail of the repeatedly diagnosed leptokurtic distributions; and on the other, there is a huge presence of zero-value returns in the sample.

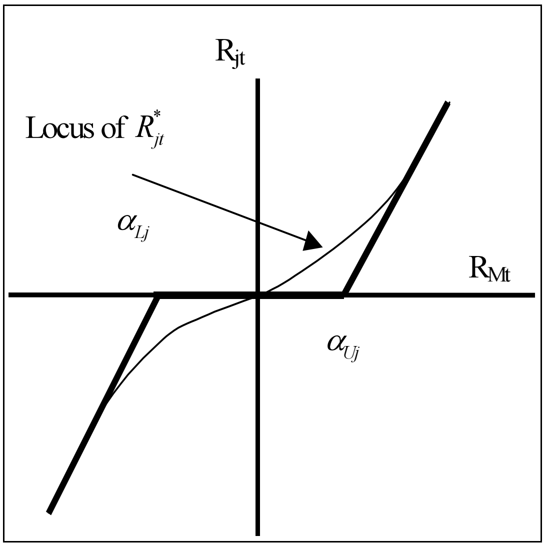
With respect to the outliers alone, an OLS regression will accord these too much weight relative to their overall importance and thereby produce parameter estimates that are inefficient.[162] This will be the case even in a well-traded market.

What makes a friction modelling approach very attractive in the face of this evidence, is its employment of numerical estimation techniques with respect to maximum likelihood estimation. This circumvents the limitations imposed by the requirements of OLS regression.

6.3 Friction Methodology

The basic model used for estimating expected returns in the presence of friction is adapted from Lesmond, Ogden and Trzcinka (1999). The observed daily return (for each company *j* on day *t*) is R_{jt}. This variable may take on positive, zero or negative values, and — depending on the thinness of trading of the particular company share — there may be many zero values. It is assumed that a zero value will be associated with small values of returns on the market index. On average, R_{jt} will take on values that follow the three-part linear (zig-zag) path depicted in Figure 6-3, which implies it will move in the same direction as changes in the market, R_{Mt}.

Figure 6-3: Schematic Diagram of a Friction Model for Calculation of Expected Returns.



The line segment between α_{Lj} and α_{Uj} explicitly represents the region in which zero-value returns are expected — which means that this model sets out to model the effect of these

[162] Dillen and Stolz (1999), p. 44.

(whether they be generated by prices that fail to shift or by the absence of trading in the share) and therefore impound them into the estimation of expected return parameters.

A "true" daily return for company *j*, is denoted as R^*_{jt}. Unfortunately this remains unobserved; however it would theoretically furnish near-zero values commensurate with those small values of market index returns in keeping with the curve that sweeps through the origin in Figure 6-3. The model is set up as follows:

$$R^*_{jt} = \beta_j R_{Mt} + \varepsilon_{jt}$$

Where

$$\begin{cases} R_{jt} = R^*_{jt} - \alpha_{Lj} & \text{if} \quad R^*_{jt} < \alpha_{Lj} \\ R_{jt} = 0 & \text{if} \quad \alpha_{Lj} \le R^*_{jt} \le \alpha_{Uj} \\ R_{jt} = R^*_{jt} - \alpha_{Uj} & \text{if} \quad R^*_{jt} > \alpha_{Uj} \end{cases} \tag{6.1}$$

However, the fact that R^*_{jt} is unobservable and α_{Lj} and α_{Uj} are endogenous makes Equation (6.1) hard to work with. The specification of inputs into the model's maximum likelihood estimation procedure requires some simplification of this.

In the world at large, and in this study's data set, it is quite possible for R_{jt} to be negative instead of positive in a rising market, or positive when the market is falling — hence we can expect a cloud of both positive and negative observations to be associated with increases in the independent variable, R_{Mt}. Hence, the assignment of observations to the upper region is not dependent on the sign of the unobservable R^*_{jt} or the observed R_{jt}, but on the requirement that R_{Mt} is positive. (However the theoretical locus of R^*_{jt} values in Figure 6-3 does ordain that R^*_{jt} is positive when R_{Mt} is positive.) Likewise, whatever the sign of R_{jt}, the lower region requires the matching R_{Mt} observation to be negative. A practical implementation of the model is as follows[163]:

[163]This is developed from Lesmond, Ogden and Trzcinka (1999), pp. 1120 – 1122. It will immediately be obvious that Equation (6.2) differs in its restrictions from those stated in their Equation (1); but Equation (6.2) has been altered to take into account Lesmond et al's sentence (p.1122) in which they explain that in their likelihood function (Equation (2)) that "…R_1 and R_2 denote the regions where the measured return, R_{jt} is nonzero in negative and positive market return regions, respectively. R_0 denotes the zero returns." This interpretation was confirmed in an

$$\begin{cases} R_{jt} = R_{jt}^{*} - \alpha_{Lj} & \text{if} \quad R_{jt} \neq 0 \ and \ R_{Mt} < 0 \\ R_{jt} = 0 & \text{if} \quad R_{jt} = 0 \\ R_{jt} = R_{jt}^{*} - \alpha_{Uj} & \text{if} \quad R_{jt} \neq 0 \ and \ R_{Mt} > 0 \end{cases} \tag{6.2}$$

The final embedded assumption is that the non-zero observations of R_{jt} are normally distributed. This was found to be the case with 33.23% of the data sets in terms of a Lilliefors Test with a five percent error, while the returns distributions with zero-value returns included was 3.10 percent. One advantage of assuming a normal distribution of non-zero observations is that the normal probability density function and the cumulative normal density function can be used in the maximum likelihood estimation procedure. Further, it allows for the computation of *Z*-values (from which confidence intervals can be calculated), and the testing of parameters for significant differences from zero can be performed and the associated *p*-values can be recorded.

In keeping with Equations (6.1) and (6.2) the three-part likelihood function is shown in Equation (6.3):

$$L = \prod_{t \in R_{LOWER}} \frac{1}{\sigma_j} \phi_1 \left(\frac{\varepsilon_t}{\sigma} \right) \prod_{t \in R_0} \Pr(\text{no change}) \prod_{t \in R_{UPPER}} \frac{1}{\sigma_j} \phi_3 \left(\frac{\varepsilon_t}{\sigma} \right) \tag{6.3}$$

Here the symbols R_{LOWER}, R_0 and R_{UPPER} stand for the three regions depicted in Figure 6-3 and t denotes an observation assigned to a given region. The lower region accounts for decreasing company returns (give or take the presence of some anomalous increasing observations), the zero region contains company returns that are zero in value, and the upper region accounts for increasing returns (allowing for the presence of anomalous decreasing company return observations). In Equation (6.3), $\phi_L \left(\frac{\varepsilon_t}{\sigma} \right)$ is the standard normal density function of the residuals of the negative returns in the lower region, and $\phi_U \left(\frac{\varepsilon_t}{\sigma} \right)$ the standard normal density function of the residuals of the positive returns in the upper region, where σ is the standard deviation estimated from the sample of all observations of observed returns excluding the zero value observations assigned to the zero region. In accordance with Lesmond et al (1999) and Maddala (1983), the full likelihood function, complete with parameters to be estimated is presented in

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email communication with Dr Lesmond, who also kindly made part of his thesis (pertaining to methodology) and his Fortran code available.

Equation (6.4), where $\Phi_L(\cdot)$ and $\Phi_U(\cdot)$ are the cumulative normal density functions of the standard normal distribution for lower and upper regions.[164]

$$\begin{aligned} L\left(\alpha_{Lj},\alpha_{Uj},\beta_j,\sigma_j \middle| R_{jt},R_{Mt}\right) &= \prod_L \frac{1}{\sigma_j}\phi_L\left[\frac{R_{jt}+\alpha_{Lj}-\beta_j\cdot R_{Mt}}{\sigma_j}\right] \\ &\times \prod_0 \left[\Phi_U\left(\frac{\alpha_{Uj}-\beta_j\cdot R_{Mt}}{\sigma_j}\right)-\Phi_L\left(\frac{\alpha_{Lj}-\beta_j\cdot R_{Mt}}{\sigma_j}\right)\right] \\ &\times \prod_U \frac{1}{\sigma_j}\phi_U\left[\frac{R_{jt}+\alpha_{Uj}-\beta_j\cdot R_{Mt}}{\sigma_j}\right] \end{aligned} \tag{6.4}$$

In natural logarithmic terms, the likelihood function becomes:

$$\begin{aligned} \ln L = &\sum_L \ln\frac{1}{\left(2\pi\sigma_j^2\right)^{1/2}}-\sum_1\frac{1}{2\sigma_j^2}\left(R_{jt}+\alpha_{Lj}-\beta_j\cdot R_{Mt}\right)^2 \\ &+\sum_0 \ln\left[\Phi_{3j}\left(\frac{\alpha_{Uj}-\beta_j\cdot R_{Mt}}{\sigma_j}\right)-\Phi_{1j}\left(\frac{\alpha_{Lj}-\beta_j\cdot R_{Mt}}{\sigma_j}\right)\right] \\ &+\sum_U \ln\frac{1}{\left(2\pi\sigma_j^2\right)^{1/2}}-\sum_3\frac{1}{2\sigma_j^2}\left(R_{jt}+\alpha_{Uj}-\beta_j\cdot R_{Mt}\right)^2 \end{aligned} \tag{6.5}$$

The negative of this likelihood function is then minimised to produce solutions for the two bounds, α_{Lj} and α_{Uj}, and for the two other parameters, β_j and σ_j. This minimisation process is achieved by a quasi-Newton non-linear numerical optimisation procedure called ‘optim’ in Scilab.[165] The fact that the process is non-linear liberates friction model methodology from the linear assumption required by the Market Model. The computer code for the procedures used in this chapter are documented and explained in Appendix J.

Lesmond, Ogden and Trzcinka (1999) was largely based on Lesmond (1995), which furnished two methods for computing the expected return, E(R_j) developed from Maddala (1983) — one for an unconditional expected return which includes the zero-return region, and the other for a conditional expected return, which excludes returns falling in the zero region.

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[164] A comment on the configuration of the equation is provided in Appendix J.1.

[165] The computer software which was ultimately used for estimating all friction model procedures was Scilab, which turned out to be far more user-friendly than Matlab for this purpose.

Lesmond's unconditional expected return formulation is as follows[166]:

$$\begin{aligned}
E\left(R_j\right) &= \Pr\left(R_j < 0\right)\cdot E\left(R_j \middle| R_j < 0\right) + \Pr\left(R_j = 0\right)\cdot E\left(R_j \middle| R_j = 0\right) \\
&\quad + \Pr\left(R_j > 0\right)\cdot E\left(R_j \middle| R_j > 0\right) \\
&= \left(1-\Phi_{jL}\right)\left[-\alpha_{jL} + \beta_j R_M\right] + E\left(\varepsilon_{jL} \middle| \varepsilon_{jL} < -\alpha_{jL} + \beta_j R_M\right) \\
&\quad + \left(\Phi_{jU} - \Phi_{jL}\right)\cdot 0 \\
&\quad + \Phi_{jU}\left[-\alpha_{jU} + \beta_j R_M\right] + E\left(\varepsilon_{jU} \middle| \varepsilon_{jU} < -\alpha_{jU} + \beta_j R_M\right) \\
&= \left(1-\Phi_{jL}\right)\left[-\alpha_{jL} + \beta_j R_M - \sigma_j \frac{\phi_{jL}}{\left(1-\Phi_{jL}\right)}\right] + \Phi_{jU}\left[-\alpha_{jU} + \beta_j R_M + \sigma_j \frac{\phi_{jU}}{\Phi_{jU}}\right] \\
&= -\alpha_{jL}\left(1-\Phi_{jL}\right) - \alpha_{jU}\Phi_{jU} + \beta_j R_M\left(1+\Phi_{jU}-\Phi_{jL}\right) + \sigma_j\left(\phi_{jU}-\phi_{jL}\right)
\end{aligned} \tag{6.6}$$

Equation (6.6) shows that the unconditional expected return builds in the influence of market (systematic) risk captured by the Market Model (and by all CAPM models), and in addition incorporates the influence of effective transactions costs — the estimation and nature of which were the primary focus of interest for Lesmond (1995) and Lesmond, Ogden and Trzcinka (1999). Also, the presence of σ in the equation indicates that variance in a set of company returns is, in Lesmond's words, "a priced element".[167] With respect to the formulation of conditional expected returns, the zero-returns argument is dropped out of Equation (6.6) and the specification becomes[168]:

$$\begin{aligned}
E\left(R_j \middle| R_j \neq 0\right) &= \Pr\left(R_j < 0\right)\cdot E\left(R_j \middle| R_j < 0\right) + \Pr\left(R_j > 0\right)\cdot E\left(R_j \middle| R_j > 0\right) \\
&= \left[-\alpha_{jL} + \beta_j R_M\right] + E\left(\varepsilon_{jL} \middle| \varepsilon_{jL} < -\alpha_{jL} + \beta_j R_M\right) \\
&\quad + \left[-\alpha_{jU} + \beta_j R_M\right] + E\left(\varepsilon_{jU} \middle| \varepsilon_{jU} < -\alpha_{jU} + \beta_j R_M\right) \\
&= -\left(\alpha_{jL} + \alpha_{jU}\right) + \beta_j R_M + \sigma_j\left(\frac{\phi_{jU}}{\left(1+\Phi_{jU}\right)} - \frac{\phi_{jL}}{\Phi_{jL}}\right)
\end{aligned} \tag{6.7}$$

Both formulations of expected return are useable, with respect to the current study, in the determination of ARs if these are to be employed as the dependent variable in a cross-sectional

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[166] Lesmond (1995), Chapter 3, Subsection 3.2.1, Equation 14. This chapter was provided electronically by the author.
[167] Ibid, final sentence of Subsection 3.2.2.
[168] Ibid, Chapter 3, Subsection 3.2.2, Equation 15.

restricted least squares regression. But only the conditional expected return is useful when an LDV friction model is developed in Subsection 6.4.2 (and onward) for analysis of what happens at the time of the dividend and earnings announcement event, employing ΔDPS and ΔEPS as independent variables. The methodological details of that friction model are provided in that later subsection along with its results.

6.4 Friction Results

6.4.1 Estimation of Expected Returns on the 100-day Period

When the 948 company/event estimation period data sets were passed to the LDV friction model procedure, only 25 of them could not be processed on the ground of insufficient observations in any one region. This dropped the sample size to 923. Given that the company/event sets were scheduled in descending order in terms of the variable, 'DAYSTRADED' (the number of market days on which the company's shares actually changed hands), it became clear that the dysfunctional sets were at the bottom end. Ten of these were the ten most poorly-traded stocks in the study, while the other 15 are all numbered within the poorest-traded 45. The best-transacted of these, event set No. 904, traded on only 28 of the 100 days, while the least, No. 948, traded on a total of 4 days.

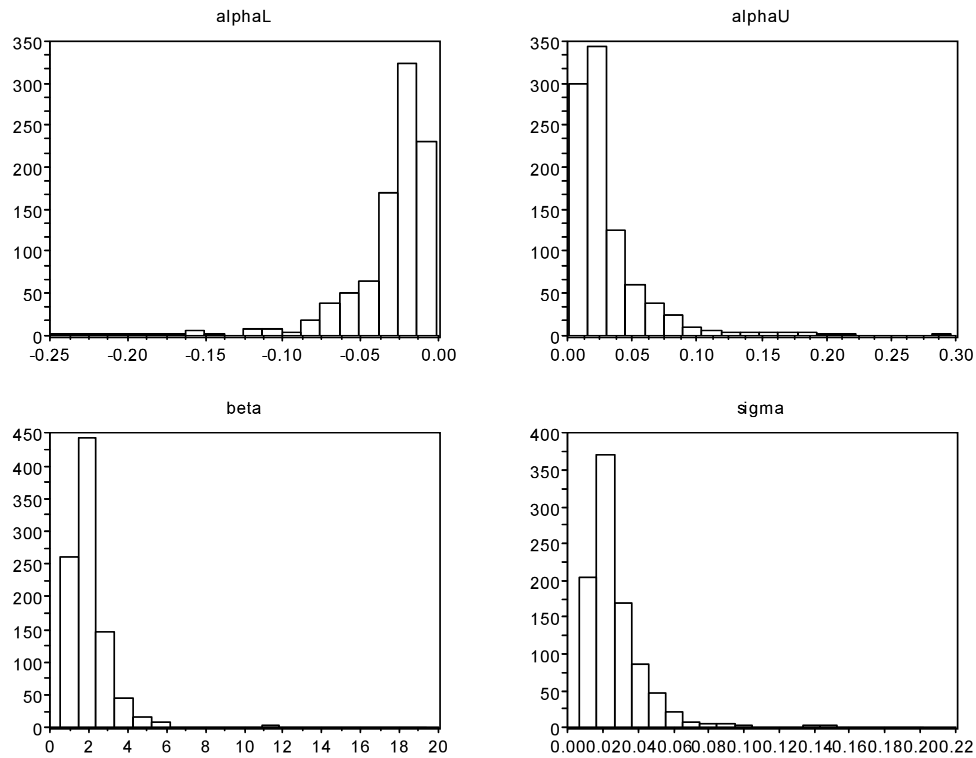
Table 6-2 summarises the characteristics of the 923 optimised sets of parameters.

Table 6-2: Characteristics of the 923 Optimised Sets of Parameters.

Parameter	Mean	Minimum	Maximum	Std Deviation
α_L	-0.0304	-0.2499	-0.0012	0.0293
α_U	0.0297	0.0007	0.2960	0.0291
β	2.0346	0.4962	19.388	1.2279
σ	0.0277	0.0069	0.2020	0.0185

The dataset furnishing the highest beta was No. 544, which traded on 89 days, and which contained two large outliers — one negative and one positive. This certainly indicates that the LDV friction model estimates are sensitive to outliers. In the third panel of Figure 6-4, which contains histograms of the four parameters, it is clear that the betas are quite closely clustered about the mean of 2.03 with some skewing to the right. It is interesting that this mean is double the standard CAPM mean of 1.0 and much larger than the Market Model mean beta of 0.472 in Table 7-3 on page 194. It is also much more credible given that firms in the sample are not necessarily large firms at all — although the maintenance of a dividend payout policy does argue that the firms will tend to be relatively stable. Arguably this is a function of the exclusion of zero observations. With respect to the bounds α_L and α_U, most observations have an absolute value closer to zero than 0.05, while observations with values in excess of ±0.1 can be considered to be outliers. With respect to the standard deviations in the fourth panel, most appear to be less than 0.05.

Figure 6-4: Histograms of the Four Parameters of the Friction model.



Perhaps more interesting than the estimated parameters themselves are the expected returns generated from them. The summary characteristics of all 923 distributions of unconditional and conditional expected returns (as measured over the 100-day estimation period) are shown in Table 6-3 along with the equivalent results underlying the OLS estimation procedures used in Chapter 5 and calculated here for convenience.

In the first column of Panel A, it is clear that the LDV friction model furnishes expected return distributions that have means that have a higher absolute value, and that these distributions exhibit greater variation. However, with respect to size, the unconditional expected returns have the greatest positive value while the conditional ones are actually negative. The OLS expected returns, on average are positive and closer to zero. This implies that, for observed returns on day t_0 that are relatively large and positive, the unconditional expected returns could be predicted to furnish smaller abnormal returns than the OLS model, while the conditional expected return would actually produce the largest AR.

Table 6-3: Comparison of Expected Returns.

Expected Return Distributions[1]	Mean	Maximum	Minimum	Std Deviation
Panel A: Expected Return Distribution Means (100-Day Estimation Period)				
Unconditional	0.0013	0.0290	- 0.0251	0.0044
Conditional	- 0.0062	0.0066	- 0.0436	0.0054
OLS Exp. Return Distributions	0.0004	0.0093	-0.0083	0.0022
Panel B: Expected Return Distribution Standard Deviations (100-Day Estimation Period)				
Unconditional	0.0165	0.0906	0.0046	0.0084
Conditional	0.0154	0.1203	0.0025	0.0093
OLS Exp. Return Distributions	0.0050	0.0361	3.19E-06	0.00485
Panel C: Expected Return Distribution Means (21-Day Test Period)				
Unconditional Expected Returns	0.0002	0.0252	- 0.0463	0.0060
Conditional Expected Returns	- 0.0073	0.0112	- 0.0577	0.0068
OLS Expected. Returns	9.76E-05	0.0118	-0.0150	0.0025
Panel D: Expected Return Distribution Standard Deviations (21-Day Test Period)				
Unconditional Expected Returns	0.0158	0.1366	0.0025	0.0113
Conditional Expected Returns	0.0150	0.1826	0	0.0124
OLS Expected Returns	0.0044	0.0625	5.56E-06	0.0049

[1] 923 sets of Expected Returns data

Also in the 4th column of Panel A, the distribution of unconditional means has a standard deviation that is double that of the OLS means distribution to the four decimal places reported. The conditional mean distribution has yet a larger standard deviation. However, there is no immediate explanation for why the mean of the conditional means distribution should be negative.

When forecasted forward onto market return data available in the 21-day test period, the LDV friction model unconditional expected returns (reported in Panels C and D), again turned out to be larger than those produced by OLS, while the conditional expected returns continued to be smaller. The effect indeed was that the test period ARs based on unconditional expected returns were the smallest; and those based on the LDV friction model conditional returns were the largest. The AR distributions' mean and standard deviation characteristics are reported in Table 6-4:

It is a very interesting question as to why the LDV friction model furnishes conditional expected returns that are smaller rather than larger than OLS estimates, and therefore ARs which are larger. When no trade took place on a particular day (or there was at least one trade but the closing price just did not change), the zero value of R_{jt} was assigned to the expected return and also to the AR for that day — and Equation (6.7) did not apply.

Table 6-4: Comparison of Characteristics of Abnormal Returns.

Expected Return Distributions[1]	Mean	Maximum	Minimum	Std Deviation
Panel A: Abnormal Return Distribution Means (21-Day Test Period)				
Unconditional Abnormal Returns	-0.0004	0.0013	-0.0016	0.0007
Conditional Abnormal Returns	0.0071	0.0092	0.0062	0.0007
OLS Abnormal Returns	-0.0002	0.0009	-0.0015	0.0006
Panel B: Abnormal Return Distribution Standard Deviations (21-Day Test Period)				
Unconditional Abnormal Returns	0.0287	0.0560	0.0235	0.0070
Conditional Abnormal Returns	0.0285	0.0564	0.0218	0.0074
OLS Abnormal Returns	0.0239	0.0540	0.0185	0.0078

[1] 923 sets of 21-day test period results

This had the effect of bringing the treatment of ARs into line with Kallunki's (1997) "lumped return" method mentioned in Section 2.3.2 of Chapter 2. One item which surfaced as a result of investigating this question was that there was one company/event data set which furnished nothing but zero values for R_{jt} over the entire test period (the 889th ranked by number of actively traded days, which recorded only 33 trades in the 100-day estimation period.)

6.4.1.1 Cross-Sectional Regression Results

Table 6-5 reports the results from a restricted least squares cross-sectional regression in which the dependent variable CAR3Day was cumulated from ARs obtained from the LDV friction model's conditional expected returns. (The results for the equivalent procedure employing ARs derived from LDV friction model unconditional expected returns are reported in Appendix J.)

The conditional ARs give rise to relatively less evidence of investor awareness of dividend or earnings news than did the unconditional AR procedures. With respect to a one-day event window on the full sample, both first-order variables (ΔDPS and ΔEPS) are confirmed as significant by a strongly significant first-order F-statistic. By contrast, the fully-traded subset of 211 company/events furnishes no significant results (the ΔEPS association that was significant in the same column in Table J-1 has dropped out). The more thinly-traded subsample of 712 company/events furnishes a significant DI-EI interaction in the unrestricted equation along with a significant first-order ΔDPS effect; but there is no significant interaction F-statistic to give it authenticity. Only the first-order variable is confirmed in this way in the subsample.

Table 6-5: Restricted Least Squares Regressions with Conditional Abnormal Returns.

Regressand	CAR3Day			ARt_0		
Sample by Days Traded	All Obs.	100 Days	<100 Days	All Obs.	100 Days	<100 Days
Coefficient (p-Values)						
DD-ED (INTERCEPT	0.0098494 (0.1342)	0.010114 (0.2814)	0.0090628 (0.2622)	0.0042545 (0.3713)	0.0020016 (0.7546)	0.0022151 (0.7061)
ΔDPS	0.0009828 (0.1787)	3.747E-05 (0.9827)	0.000888 (0.2817)	0.0022861 (0.0000)	-0.001699 (0.1515)	0.0025311 (0.0000)
ΔEPS	-8.23E-05 (0.8396)	0.0006275 (0.4924)	-0.000108 (0.8150)	0.0006174 (0.0362)	0.000429 (0.4919)	0.0006385 (0.0570)
DI-EI	0.031963 (0.0003)	0.0086206 (0.4991)	0.038503 (0.0003)	0.012149 (0.0551)	0.01205 (0.1673)	0.015448 (0.0467)
DD-EI	0.007565 (0.5835)	-0.019265 (0.2707)	0.016828 (0.3360)	0.0009412 (0.9249)	-0.020629 (0.0848)	0.0095614 (0.4520)
DI-ED	0.018425 (0.0946)	0.0088935 (0.5874)	0.02234 (0.0950)	0.0048003 (0.5472)	0.0005854 (0.9583)	0.0098122 (0.3127)
DNC-EI	0.012886 (0.1646)	0.0066819 (0.5858)	0.015864 (0.1717)	0.0056456 (0.4001)	0.0025034 (0.7649)	0.0097996 (0.2454)
DNC-ED	0.0023312 (0.7819)	0.005429 (0.6369)	0.0024159 (0.8170)	0.0002023 (0.9735)	0.0022084 (0.7785)	0.0022307 (0.7689)
Observations Count R^2 Statistics, F-Statistics and p-Values						
N	923	211	712	948	211	712
$R^2_{UNRESTRICTED}$	0.0403	0.0210	0.0469	0.0683	0.0415	0.0816
$R^2_{EQUATION\ (ii)}$	0.0184	0.0080	0.0192	0.0619	0.0015	0.0741
$R^2_{EQUATION\ (iii)}$	0.0384	0.0185	0.0454	0.0412	0.0311	0.0499
$F_{UNRESTRRICTED}$	5.4943 (0.0000)	0.62132 (0.7380)	4.9541 (0.0000)	9.5895 (0.0000)	1.2544 (0.2748)	8.9395 (0.0000)
$F_{EQUATION\ (ii)}$	8.6361 (0.0002)	0.84083 (0.4328)	6.9279 (0.0010)	30.374 (0.0000)	0.15464 (0.8568)	28.385 (0.0000)
$F_{EQUATION\ (iii)}$	7.3313 (0.0000)	0.77268 (0.5704)	6.7103 (0.0000)	7.8874 (0.0000)	1.3179 (0.2578)	7.4135 (0.0000)
$F_{FIRST\ ORDER}$	0.9035 (0.4055)	0.2561 (0.7743)	0.5847 (0.5575)	13.6713 (0.0000)	1.0940 (0.3368)	12.1565 (0.0000)
$F_{INTERACTION}$	4.1753 (0.0009)	0.5375 (0.7477)	4.1050 (0.0011)	1.2932 (0.2645)	1.6927 (0.1378)	1.1461 (0.3345)

Hence, the conditional ARs in Table 6-5 produce a simpler, starker picture than do the unconditional ARs in Table J-1. In Table 6-5, a three-day event window shows evidence of one dividend-and-earnings combination (good news) having an impact on share price, while in the one-day event window case, dividends appear to be more important than earnings — but with no particular combination standing out as being of note.

6.4.2 Friction Models of the Day Zero Event Window

I now propose a friction model that removes the need to resort to any regression procedure in searching for evidence investor behaviour indicative of a response to a dividend signal. Initially, the 923 observations of day zero conditional abnormal returns derived from the friction model in Subsection 6.4.1 will be used as the dependent variable in a friction model procedure in which the independent variable is ΔDPS. Then, in a second sweep in Subsection 6.4.2.2, this independent variable will be replaced by ΔEPS. Following that in Subsection 6.4.2.3, both independent variables will be employed together.

6.4.2.1 Conditional Abnormal Returns and ΔDPS

While a more general model configuration for all of these day zero procedures is furnished in Appendix J, the LDV friction model in the first instance is:

$$AR_j^* = \beta_j \Delta DPS_j + \varepsilon_j$$

$$\textit{Where} \quad \begin{cases} AR_j = AR_j^* - \alpha_{Lj} & \text{if} \quad AR_j \neq 0 \textit{ and } \Delta DPS_j < 0 \\ AR_j = 0 & \text{if} \quad AR_j = 0 \\ AR_j = AR_j^* - \alpha_{Uj} & \text{if} \quad AR_j \neq 0 \textit{ and } \Delta DPS_j \geq 0 \end{cases} \tag{6.8}$$

The results obtained from this procedure are reported in Table 6-6. Below a 5.49 percent lower bound, a change in dividend is associated with an increasingly negative AR, while above a 1.53 percent upper bound, the change in dividend is associated with a rising positive AR. The linear approximation of the rate of change ($\beta_{\Delta DPS}$) is strongly significantly different from zero; but the rate of change is quite small (0.0018 per unit change in the dividend variable. The results are reported as point estimates in the table's first column, and in terms of a 95 percent confidence interval in the second and third columns. It must be emphasised that this model is misspecified at least to the extent that it totally ignores the role of the simultaneous earnings announcement information.

Table 6-6: Conditional Abnormal Returns on Day Zero and ΔDPS.

Parameter	MLE	95% Conf. Int Lower Bound	95% Conf. Int Upper Bound	p-Values
α_L	-0.0549	-0.0603	-0.0495	0.0000
α_U	0.0153	0.0120	0.0186	0.0000
$\beta_{\Delta DPS}$	0.0018	0.0011	0.0024	0.0000
σ	0.0385	0.0361	0.0408	0.0000
923 observations				

6.4.2.2 Conditional Abnormal Returns and ΔEPS

When we replace the change-in-dividend variable with a change-in-earnings variable, the LDV friction model has one subtle change. Because, ΔEPS never exactly equals zero, the inequalities in the conditions become strict inequalities:

$$AR_j^* = \beta_j \Delta EPS_j + \varepsilon_j$$

Where

$$\begin{cases} AR_j = AR_j^* - \alpha_{Lj} & \text{if} \quad AR_j \neq 0 \textit{ and } \Delta EPS_j < 0 \\ AR_j = 0 & \text{if} \quad AR_j = 0 \\ AR_j = AR_j^* - \alpha_{Uj} & \text{if} \quad AR_j \neq 0 \textit{ and } \Delta EPS_j > 0 \end{cases} \tag{6.9}$$

The results are very similar to those reported on ΔDPS. There is approximately a 6% range about zero defined by α_L at –4.08% and α_U at 2.15% outside which a change in announced earnings does impact on the size of abnormal earnings; but the rate of change of this impact is again small (0.0008 per unit change in the earnings variable). And again the model is misspecified in the absence of the dividend announcement variable. However, in keeping with what was reported in Table 5-12 on page 136 with respect to the Market Model-based methodology, the ΔEPS coefficient (0.0008) in Table 6-7 is under half the size of the ΔDPS coefficient (0.0018) reported above in Table 6-6.

Table 6-7: Conditional Abnormal Returns on Day Zero and ΔEPS.

Parameter	MLE	95% Conf. Int Lower Bound	95% Conf. Int Upper Bound	p-Values
α_L	-0.0408	-0.0449	-0.0366	0.0000
α_L	0.0215	0.0179	0.0252	0.0000
$\beta_{\Delta EPS}$	0.0008	0.0004	0.0012	0.0000
σ	0.0383	0.0360	0.0406	0.0000
923 observations				

6.4.2.3 Conditional Abnormal Returns and both ΔEPS and ΔEPS

There were two possible ways of defining the upper and lower regions. The first was to define the prerequisite for upper region membership as $AR_j \neq 0$ and $\sum_{i=1}^{2} X_i \geq 0$ where $\sum_{i=1}^{2} X_{ij} = \Delta DPS_j + \Delta EPS_j$; and for lower region membership, $AR_j \neq 0$ and $\sum_{i=1}^{2} X_i < 0$. This configuration allowed all 923 observations to be used. The model is:

$$AR_j^* = \beta_{1j}\Delta DPS_j + \beta_{2j}\Delta EPS_j + \varepsilon_j$$

$$\textit{Where} \quad \begin{cases} AR_j = AR_j^* - \alpha_{Lj} & \text{if} \quad AR_j \neq 0 \textit{ and} \left(\Delta EPS_j + \Delta DPS_j\right) < 0 \\ AR_j = 0 & \text{if} \quad AR_j = 0 \\ AR_j = AR_j^* - \alpha_{Uj} & \text{if} \quad AR_j \neq 0 \textit{ and} \left(\Delta EPS_j + \Delta DPS_j\right) \geq 0 \end{cases} \tag{6.10}$$

In the result of the maximum likelihood procedure reported in Table 6-8, it is strongly clear that the beta of the change in dividend variable is insignificantly different from zero in the presence of an earnings announcement variable. This result contradicts the finding in Table 5-12 on page 136, where the inclusion of ΔDPS in a Market Model-based procedure caused the coefficient of ΔEPS to drop into insignificance.

Table 6-8: Conditional Abnormal Returns on Day Zero and both ΔDPS and ΔEPS (N = 923).

Parameter	MLE	95% Conf. Int Lower Bound	95% Conf. Int Upper Bound	p-Values
α_L	-0.0403	-0.0443	-0.0362	0.0000
α_L	0.0206	0.0170	0.0243	0.0000
$\beta_{\Delta DPS}$	-0.0001	-0.0007	0.0006	0.4120
$\beta_{\Delta EPS}$	0.0008	0.0004	0.0012	0.0000
σ	0.0374	0.0351	0.0397	0.0000
923 observations including the DD-EI and DI-ED announcement combinations				

It can also be seen that the size of the friction region between the two bounds in Table 6-8 implies that a 6 percent change in the independent variables is necessary before any response is picked up in the AR variable.

However, there is a hidden aspect to this result. Two of the dividend and earnings announcement combinations comprise mixed news in which the two components move in opposite directions (the DD-EI and DI-ED observations). This means that one had to dominate the other in size in order for the assignment to either upper or lower region to happen. This effectively built in a hidden assumption to the effect that a change in earnings should have the same value as a change in dividend — and that a larger change in one should rightfully dominate the smaller change in the other (even if the difference in size was actually quite small). This assumption can be jettisoned by requiring that the independent variables must each be greater than or equal to zero for assignment to the upper region, and less than or equal to zero for the lower region. However, this altered specification comes at the cost of removing the DD-EI and DI-ED observations from the data set. Nevertheless, it does still allow analysis to occur with respect to observations in which earnings change while dividends do not (the DNC-EI and DNC-ED combinations). The re-specified model looks like this:

$$AR_j^* = \beta_{1j}\Delta DPS_j + \beta_{2j}\Delta EPS_j + \varepsilon_j$$

$$\text{Where} \qquad (6.11)$$

$$\begin{cases} AR_j = AR_j^* - \alpha_{Lj} & \text{if} \quad AR_j \neq 0 \ and \ \Delta EPS_j < 0,\ \Delta DPS_j \leq 0 \\ AR_j = 0 & \text{if} \quad AR_j = 0 \\ AR_j = AR_j^* - \alpha_{Uj} & \text{if} \quad AR_j \neq 0 \ and \ \Delta EPS_j > 0,\ \Delta DPS_j \geq 0 \end{cases}$$

The result furnished in Table 6-9 is quite different from that in Table 6-8. Now, the beta of the change-in-dividend variable is more than four times larger than that of the change-in-earnings variable; and the *p*-values of all parameters indicate the probability of a Type 1 error of much less than one percent. This finding is more in keeping with the Market Model-based results in Table 5-12 on page 136; but this friction model result furnishes a strongly significant ΔEPS coefficient where the Market Model based ΔEPS coefficient was insignificant. It also agrees with the result in Table 6-5 where, with respect to the procedure on ARt_0 on the full sample, the change in dividends and the change in earnings were found to be influential.

Table 6-9: Conditional Abnormal Returns on Day Zero and both ΔDPS and ΔEPS.

Parameter	MLE	95% Conf. Int Lower Bound	95% Conf. Int Upper Bound	p-Values
α_L	-0.0533	-0.0603	-0.0463	0.0000
α_L	0.0257	0.0193	0.0320	0.0000
$\beta_{\Delta DPS}$	0.0055	0.0043	0.0068	0.0000
$\beta_{\Delta EPS}$	0.0017	0.0010	0.0024	0.0000
σ	0.0680	0.0640	0.0719	0.0000
807 observations that exclude the DI-ED and DD-EI announcement combinations				
Minimum Likelihood Estimate = -466.21223				

The independent variables in Table 6-9 exert their effect on the dependent variable, AR above and below a friction region between the upper and lower alphas, which amounts to almost 0.08 in width. This is one third larger than the six percent recorded in Table 6-8. The results in Table 6-9 suggest that, both the dividend component of an announcement and the earnings component play a significant role in price change on day zero.

The behaviour of the bounds, α_L and α_U in Table 6-9 is also of interest. Lesmond, Ogden and Trzcinka (1999) argued, with respect to the relation between company returns and returns on the market index, that investors tend not to transact when the perceived gain from trading does not exceed what they call the round trip effective transaction cost. The fact that R_{Mt} has been replaced in Equation (6.11) by other independent variables does not change the bounds from being a measure of some form of effective transactions cost. However, we are no longer just dealing with a possible monetary cost, but also with a loss-aversion effect. Kahneman and Tversky (1979), in their promulgation of prospect theory, documented loss aversion as one of the key behaviours identifiable in decision makers making choices under uncertainty; and this was observed, in terms of a 'disposition effect' by Odean (1998) in a study of a brokerage firm's transactions records showing client reluctance to realise losses but greater eagerness to realise gains. More recently, Norsworthy, Gorener, Morgan, Schuler and Li (2004) have confirmed the presence of loss aversion in share market trading behaviour, which they were able to identify in the results generated by their four-state asset-pricing model. Here, in Table 6-9 we can see evidence of the disposition effect in the fact that the lower bound is approximately twice the distance from zero measured by the upper bound. It appears that investors will trade more readily on the basis of good news, where the seller is able to realise a small profit, than on the basis of bad news where the seller would realise a small loss. The bad news has to be of a greater magnitude before sellers decide to divest. This asymmetry in the values of the bounds has also been apparent in Table 6-8, Table 6-7, Table 6-6 and in Table 6-2.

More importantly, the friction region between α_L and α_U can also be interpreted in a more direct manner with respect to dividend and earnings signalling. Between these two bounds the change in the announcement variables is too small for a signal to be sent — of at least too small to be acted upon.

A number of further explorations of the nature of friction modelling with conditional ARs, ΔEPS and ΔEPS are made in Appendix J.

6.4.3 Day Zero Friction Model with First-order and Interaction Variables

So far in this chapter, friction models have been employed to consider only the performance of the two first-order variables, ΔDPS and ΔEPS. A logical progression from this point would be to incorporate into a friction model some version of the RLS regressions' dummy variables.

In the cross-sectional regression procedure, five dummy variables were employed to ascertain the presence (or not) of a significant interaction effect. It was not possible to carry all these dummies over into the maximum likelihood estimation environment. There were several reasons for this. For a start, in a friction model context, we have two alpha values where the restricted least squares regression model furnished only one — which could take on the job of proxying the announcement combination for which no dummy variable was specified. One might ask, which of the MLE alphas would take up this role? More importantly, a dummy variable is binary, taking on the value '1' if an observation belongs to the chosen category, or '0' if it does not; and a binary variable is incapable of furnishing a set of values which fit into all three of the friction model's three regions. The problem arises, that if there are no values present in a given region, then the maximum likelihood estimation procedure furnishes a hessian matrix with negatives present on the leading diagonal, which gives rise to standard errors which are the square roots of negative numbers — and are therefore imaginary. This means that the numerical search mechanism in the maximum likelihood procedure has failed to achieve convergence on an optimal value.

Nevertheless, it is an interesting question as to whether the actual combination of dividend and earnings changes present in an announcement are significantly different from each other. Therefore the friction model was reconfigured to include an additional two variables in an attempt to answer this.

1. 'GOOD+BADNEWS' this variable takes on the value '1' if the dividend and earnings announcement notified rises in both dividends and earnings, and '-1' if both items are reduced, and finally, '0' if the announcement data falls outside the good and bad-news categories.
2. '$\text{MIXEDNEWS}_{\text{DNC}}$' handles announcement combinations in which there is no change in dividend, but either a rise or fall in announced earnings. It is configured in a similar manner. If earnings go up, then MIXEDNEWS takes on the value, '1', while a drop in earnings caused it to take on the value '-1', and if the announcement actually is of neither sort, $\text{MIXEDNEWS}_{\text{DNC}}$ takes on the value, '0'.

The above variables left two dividend-and-earnings combinations unaccounted for. These were DI-ED (dividend increased with earnings decreased) and DD-EI.. These had to be left out, as all attempts to configure summations of variables to circumvent the same-sign restriction (explained in Subsection 6.4.2) merely ended up producing results with non-invertible hessian matrices. The implementation of the friction model was as follows.[169]

$$AR_j^* = \beta_{1j}\Delta DPS_j + \beta_{2j}\Delta EPS_j + \beta_{3j}D_{G+B} + \beta_{4j}D_{MIX} + \varepsilon_j$$

Where (6.12)

$$\begin{cases} AR_j = AR_j^* - \alpha_{Lj} & \text{if} \quad AR_j \neq 0 \text{ and } \Delta EPS_j < 0,\ \Delta DPS_j \leq 0, D_{G+B} \leq 0, D_{MIX} \leq 0 \\ AR_j = 0 & \text{if} \quad AR_j = 0 \\ AR_j = AR_j^* - \alpha_{Uj} & \text{if} \quad AR_j \neq 0 \text{ and } \Delta EPS_j > 0,\ \Delta DPS_j \geq 0, D_{G+B} > 0, D_{MIX} > 0 \end{cases}$$

When the DI-ED and DD-EI observations were excluded, the data set was now reduced to 807 observations. The results for the expanded model incorporating GOOD+BADNEWS and $MIXEDNEWS_{DNC}$ are in Table 6-10. In common with the unexpanded friction model, $\beta_{\Delta DPS}$ is about three time the size of $\beta_{\Delta EPS}$, and both are significant. However, both $\beta_{GOOD+BAD\ NEWS}$ and $\beta_{MIXED\ NEWS_{DNC}}$ are much larger than either of the first-order coefficients; and both are supported by p-values with less than a one percent level of error. This strongly supports the contention that investors are indeed reacting to a perception of an earnings signal at the very least. In addition, the fact that $\beta_{GOOD+BADNEWS}$ has a slightly higher value than $\beta_{MIXEDNEWSDNC}$ does suggest that the change in the announced dividend does amplify the effect of a change in announced earnings — which does not occur with respect to $MIXEDNEWS_{DNC}$.

Table 6-10: Day Zero Parameters furnished by the Expanded Friction Model with Interaction Variables.

Parameter	**MLE**	**95% Conf. Int Lower Bound**	**95% Conf. Int Upper Bound**	**p-Values**
α_L	-0.1241	-0.1645	-0.0838	0.0000
α_U	0.1030	0.0627	0.1433	0.0000
$\beta_{\Delta DPS}$	0.0027	0.0013	0.0041	0.0001
$\beta_{\Delta EPS}$	0.0007	0.0000	0.0015	0.0232
$\beta_{GOOD+BADNEWS}$	0.1039	0.0634	0.1443	0.0000
$\beta_{MIXEDNEWS}$	0.1001	0.0598	0.1404	0.0000
σ	0.0672	0.0633	0.0711	0.0000
This MLE procedure was run on 807 observations				
Minimum Likelihood Estimate = -605.26487				

[169] Specification of the restrictions in terms of the dummy variables was actually redundant as these were dependent on the restrictions associated with the two first-order variables. For instance, $D_{GOOD+BAD\ NEWS}$ could only be positive if ΔDPS and ΔDPS were both positive.

But does the expanded model in Table 6-10 incorporating GOOD+BADNEWS and $MIXEDNEWS_{DNC}$ deliver an improvement in explanatory power over the unexpanded model? A likelihood ratio test was employed to answer this question.

Unrestricted Model (Table 6-10) MLE = $L_{UNRESTRICTED}$	-605.26487
Restricted Model (Table 6-9) MLE = $L_{RESTRICTED}$	-466.21223
Likelihood Ratio = $2(L_{UNRESTRICTED} - L_{RESTRICTED})$	-278.10528
Number of restrictions	2
p-value for a χ_2^2 distribution[170]	4.07573E-61

The two MLE figures are minimum likelihood estimates which need to be multiplied by -1 to be viewed as maximum likelihood estimates. The absolute value of the difference between the unrestricted model with the two interaction dummies and the restricted model without dummies is 278.1053 which is somewhat larger than 9.21, the χ_2^2 critical value with a one percent Type 1 error probability. The p-value is 0.0000 to four decimal places, and the expanded model incorporating interaction variables is clearly superior in its explanatory power.

6.4.4 Chapter Conclusion and Discussion

This chapter set out to do two things. The first was to provide a method for estimating expected returns which did not rely on all of the assumptions that are associated with the Market Model. For instance, the Market Model, by employing OLS regression requires linearity while the friction model's employment of a quasi-Newton optimisation procedure liberates us from the linearity requirement. However, the procedure — as presented — did still make the assumption that the data was normally distributed. But the normality assumption too may be dropped if the normal cumulative density function and the normal probability density functions are replaced by their equivalents furnished by some other distribution such as the asymmetric power distribution (APD). Achieving this would be a logical next step in future employment of friction modelling with respect to event studies.

The second goal of the chapter was to provide a method for estimating expected returns which did not rely on sleight of hand or sheer blinkeredness in dealing with the thinness of trading of many of the stocks in the dataset. Far from sweeping non-trading days and zero-value company returns under the carpet, the friction model methodology explicitly sets out to model their impact on the parameters employed in constructing expected returns.

[170] Excel's CHIDIST function was used for this computation.

The third goal of this chapter was to employ the ARs generated with respect to the expected return output of a friction model procedure on every feasible company/event estimation period dataset, to determine if any evidence of an investor reacting to a dividend signal could be found. When the ARs were constructed from conditional expected returns, evidence of dividend signalling was not clear. When a three-day window was employed, only the DI-EI interaction effect was significant and it was corroborated by a significant interaction *F*-statistic. This is insufficient to separate out the effect of an earnings signal from that of the dividend signal — since both pull in the same direction in a DI-EI interaction. With respect to the one-day event window, the two first-order variables were significant together — which is not enough to separate out their signalling effects from one another. The best that could be done was to report that the ΔDPS coefficient was larger than the ΔEPS coefficient.

The fourth goal of this chapter was to develop friction models which could be used directly to investigate the behaviour in the event window. For brevity (a rare commodity in this thesis) they were restricted to either a one-day event window, or a one-day window in the context of the rest of the test period. These models certainly showed both ΔDPS and ΔEPS to be significant and that ΔDPS was exerted a greater magnitude impact on the associated ARs. In the final model, which incorporated two interaction variables modelling the effect of four of the six dividend and earnings interaction effects, some evidence was furnished that indicated that the dividend signal could be separated from the earnings signal — but the degree of separation was very subtle.

7 State Models

7.1 Chapter Introduction

In an event study employing the Market Model, the function of the Model is to generate expected returns, which when forecasted into the test period, can be subtracted from observed returns to capture the measure of surprise (an AR or CAR) provoked by the news content of the event. But the accuracy of the measure of surprise is cast into doubt by the relatively low explanatory power of expected returns which we record in the form of the r^2 statistic reported in the simple OLS procedure which is the Market Model. State asset pricing models, which are sophistications of the Market Model offer a strong improvement in explanatory power — and are worth investigating for that reason.

A four-state asset pricing model separates company returns and their matched market returns into four subsets by their paired signs and specifies a multiple regression with coefficients for each of the four subsets of market returns. This new expanded-form Market Model is called the four-state asset pricing model — and it is most definitely associated with a much higher R^2 statistic than the simple Market Model can achieve.

However, there is a second reason for investigating state models. The four-state model comes in two versions. The first is an unrotated form in which the partitioning is based on the sign of the return. The second is a rotated form in which the axes are transformed so that, according to Norsworthy et al, they more accurately capture a-priori investor expectations. This was developed by Norsworthy, Gorener, Morgan, Schuler and Li (2004).[171] Norsworthy et al found that their rotated four-state model was superior in its performance to their unrotated verson. This chapter shows that this may not be attributable to a better capture of investor's expectations.

The current study replicates the unrotated and rotated four-state models and then goes on to specify unrotated and rotated versions of a five-state model, where the fifth state is the state of a zero company return being recorded. Some evidence is furnished that indicates that the differences among versions of four-state models and five-state models are strongly dependent on the treatment of zero-value company returns.

The chapter also furnishes a five-state-two-step model. One of the reasons for the low explanatory power of the Market Model is the presence of large numbers of zero-returns in the estimation period data sets. Zero returns are the consequence of either a failure of share prices to change with trading (which may be simply liquidity trading), or an absence of trading altogether.

[171] Norsworthy, Gorener, Morgan, Schuler and Li (2004), Op. Cit. 132 (Chapter 2, Subsection 2.5).

The function of the second step is to remove the effect of extreme outliers and also liquidity trading so that the calculated expected returns become a better fit of the data as a whole, and therefore a more accurate mechanism for compiling abnormal returns. It is found that inclusion of the second step in the five-state two-step model increases the R^2.

But then the chapter goes on to study a simple three-state model, and a two-step three-state model. This last model is promoted as this researcher's choice of model to be used in an event study investigating dividend signalling. It gains this status on the ground that it is fairly simple, can be estimated on most of the available datasets without problems of lack of observations in particular states or narrow ranges, and has high explanatory power.

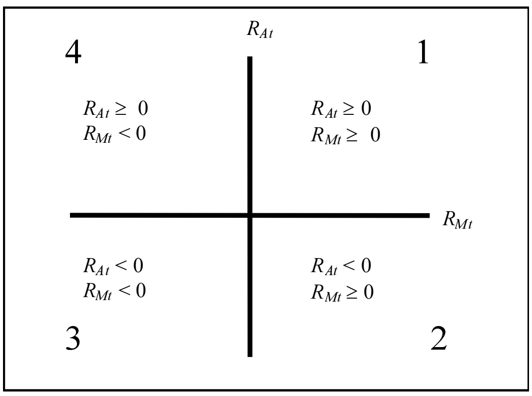
The chapter is laid out as follows. Section 7.2 explains the underlying methodology of the unrotated and rotated four state models and then goes on to specify the unrotated and rotated five-state models which are innovations furnished by this study. Following this exposition of specifications, the results of this study's estimations of four- and five-state models are tabled in Section 7.3. In Sections 7.4 and 7.5, the models with a second step are introduced and evaluated. Section 7.6 contains the chapter conclusions.

7.2 Methodology for Four- and Five-state Models

7.2.1 Four-state Unrotated Model

Following Norsworthy et al, the data set for each company/event in the current study is partitioned into four quadrants by the sign of the company return and the sign of the matched market return, where R_{iAt} is the daily return on company 'A' at time t, which in the t^{th} instance, falls into quadrant i. The four quadrants are labelled in Figure 7-1.

Figure 7-1: Classification of Quadrants used by the Four-state Model.



Investors do not know in advance to which quadrant an observation (R_{iAt}, R_M) is going to belong; but they actually *will* have a perception of what kind of behaviour is likely in each quadrant.

Jokung and Meyfredi (2003) note that this partitioning can be seen as defining bull and bear asset conditions.[172] This expectation is based on past performance.

A regression is run to separate out the behaviours in the four quadrants. The equation for this is an expansion of the traditional Market Model which contains a series of dummy variables (α_i), and R_{Mt} takes on the value of the actual market return if and only if R_{iAt} belongs to the i^{th} quadrant, and otherwise takes on the value zero.

$$R_{iAt} = \sum_{i=1}^{4} \alpha_i + \sum_{i=1}^{4} \beta_i R_{Mt} + \varepsilon_i \tag{7.1}$$

Given that the dummies (Q_1 to Q_4) take on the value '1' or zero, and replacing α_i with $\beta_i Q_i$, the equation expands to[173]:

$$\begin{aligned} R_{iAt} &= \beta_1 Q_1 + \beta_2 Q_2 + \beta_3 Q_3 + \beta_4 Q_4 \\ &\quad + \beta_5 Q_1 R_{Mt} + \beta_6 Q_2 R_{Mt} + \beta_7 Q_3 R_{Mt} + \beta_8 Q_4 R_{Mt} + \varepsilon_t \end{aligned} \tag{7.2}$$

In this equation, the first term is the intercept term — the Q_1 being redundant as distinct from incorrect. An alternative way of looking at Equation (7.2) is that it combines four separate regressions (one for each quadrant) into one regression.

7.2.2 Four-state Rotated Model

If, on a daily basis, today's expected return is deemed to be the mean of past returns, it is possible to rotate the axes so that a company return becomes a zero company return (i.e., be seated on the horizontal axis) in the case where the share is performing only as well as anticipated — and not better or worse. In other words, if a 0.02% return is anticipated, on the basis that it happens to be the mean historical return, then a return of this magnitude will fall on the rotated horizontal axis, while a return seated at any point above the axis would denote a better-than-expected performance by the company share, while any point below the rotated axis (whether or not it was actually below the original unrotated axis) would indicate worse-than-expected performance. The rotated vertical axis should be interpreted in a similar way. If a

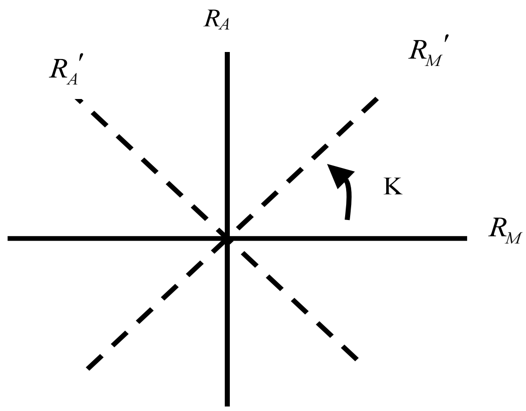
---

[172] Jokung and Meyfredi (2003), p. 3.

[173] Note that the subscript '*i*' is not carried through for the independent variable, R_{Mt} in either this or the immediately preceding equation. This is because the observation has already been assigned with respect to the company share return in conjunction with it per the decision table embedded in Figure 7-1.

market return for a particular day was seated on the rotated vertical axis, then the market's performance that day was exactly as anticipated on past mean rises or falls.

Figure 7-2: Diagram showing the Rotation Effect for Classification into Quadrants used by the Rotated Four-state Model.



The rotation of the axes is computed as K radians by a calculation based on both the mean performance of a stock and the mean performance of the market index irrespective of quadrant. The angle of rotation (counterclockwise) is:

$$K = \arctan\left({E(R_A)} \big/ {E(R_M)} \right) \tag{7.3}$$

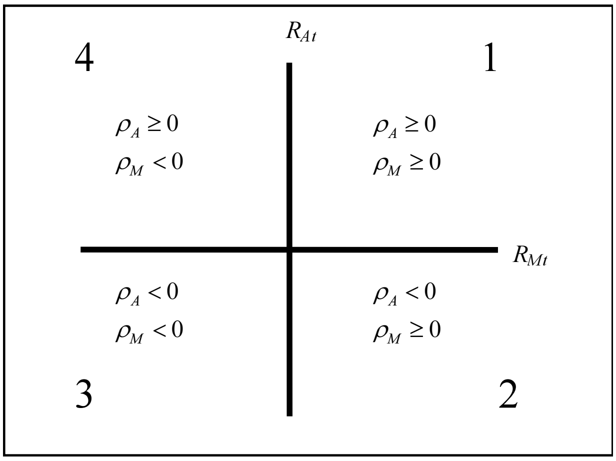
This means that the transformed axes lie at, relative to the original axes, at an extra K radians, (K+π/2), (K+π), and (K+3π/2) radians.

However, the method for determining membership of a quadrant is actually worked out on an observation-by-observation basis, where the observation is transformed relative to the original axes as shown in Figure 7-3. Given Equation (7.3), the equivalent transformation of (R_A, R_M) to (ρ_A, ρ_M) is:

$$\rho_A = \left(-R_M \sin(K) + R_A \cos(K)\right) \tag{7.4}$$

$$\rho_M = \left(R_M \cos(K) + R_A \sin(K)\right) \tag{7.5}$$

Figure 7-3: Classification into Quadrants as used by the Rotated Four-state Model.



Nevertheless, once membership of a quadrant has been assigned via the decision table embedded in Figure 7-3, the actual computation of expected returns on the 100-day estimation period data set is actually performed using original values of the $\left(R_A, R_M\right)$ observations. Norsworthy et al noted that if the rotated model did not explain investor behaviour any better than the original axes, then the R^2 of the procedure will be no higher than that of the unrotated model.[174]

Figure 7-4: Example of Classification Change with Rotation (110th Company/event Data Set).

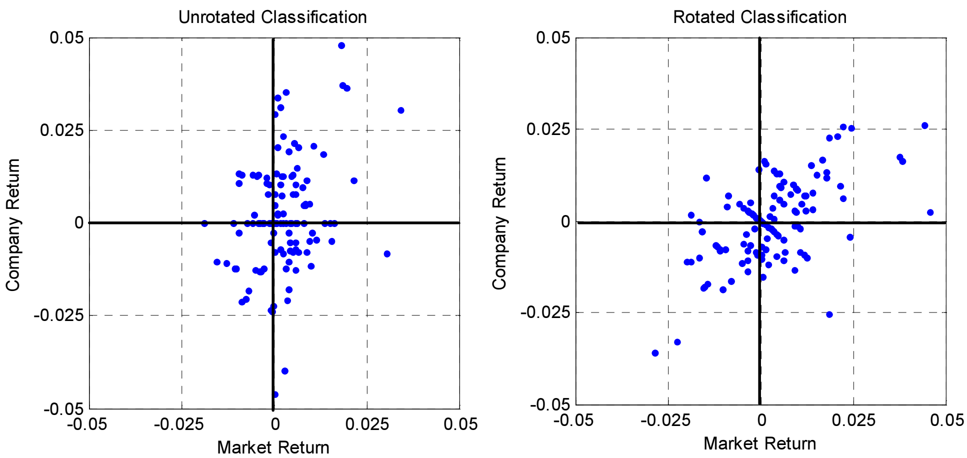


Figure 7-4 provides an actual rotation from the current study's sample. In this instance it is the 110th company/event data set in the series ranked by trading frequency, which was the Cavalier Corporation Ltd (CAV) year-end announcement made on August 26th 1993. This one was chosen as it displays archetypal properties. In particular, the rotated observations are much more strongly present in the first and third quadrants; and the zero value company returns have been

[174] Norsworthy et al, p. 19.

relocated into quadrants two and four — discernible as a line segment through the origin with a steep negative slope.

7.2.3 Five-state Conditions

One of the major points of focus of the current study is the disruptive presence of large numbers of zero-value company returns. Norsworthy et al's four-state unrotated model is easily adapted to allow for a fifth state in which company returns are either zero because there was no change in closing trading price or because trading failed to take place. In this instance the model remains a four-state model, but the quadrant membership conditions are amended to remove all zero-value company returns (and their matched market returns) from the OLS regression procedure. A zero-value company return, in terms of the friction modelling in Chapter 6.2, is its own expected return; and if there is no change in share price in the dividend-and-earnings announcement event window (or an absence of trading), the associated abnormal return is set at zero too.

The five-state model was estimated by OLS regression, and also was configured as a friction model (explicitly catering for a zero-value company return region) and its parameters estimated by maximum likelihood estimation.

$$
\begin{aligned}
R^*_{jit} &= \beta_{1j}Q_1 + \beta_{2j}Q_2 + \beta_{3j}Q_3 + \beta_{4j}Q_4 + \beta_{5j}Q_1R_M \\
&\quad + \beta_{6j}Q_2R_M + \beta_{7j}Q_3R_M + \beta_{8j}Q_4R_M + \varepsilon_{jt}
\end{aligned}
$$

Where

$$
\begin{cases}
R_{jit} = R^*_{jit} - \alpha_{Lj} & \text{if} \quad R^*_{jit} < \alpha_{Lj} \\
R_{jit} = 0 & \text{if} \quad \alpha_{Lj} \le R^*_{jit} \le \alpha_{Uj} \\
R_{jit} = R^*_{jit} - \alpha_{Lj} & \text{if} \quad R^*_{jit} < \alpha_{Lj}
\end{cases}
\tag{7.6}
$$

In practical terms, the implementation conditions in Equation (7.6) becomes, for all three regions, dependent upon the sign of the dependent variable.

$$
\begin{cases}
R_{jit} = R^*_{jit} - \alpha_{Lj} & \text{if} \quad R_{jit} < 0 \\
R_{jit} = 0 & \text{if} \quad R_{jit} = 0 \\
R_{jit} = R^*_{jit} - \alpha_{Lj} & \text{if} \quad R_{jit} > 0
\end{cases}
\tag{7.7}
$$

This is actually less complex than the implementation conditions required for the friction models employed in Chapter 6.2 where the upper and lower regions required as a membership decision criterion, the correct sign of the independent variable. However, the log likelihood function becomes rather messy unless vector notation is employed. Therefore let X be a list of all the explanatory variables and Ω be their associated coefficients, where $\left[\alpha_{Lj}, \alpha_{Uj}, \Omega_j, \sigma_j\right]$ is the vector of parameters. The log likelihood function becomes:

$$
\begin{aligned}
&L\left(\alpha_{Lj}, \alpha_{Uj}, \Omega_j, \sigma_j \middle| AR_j, X_j,\right) \\
&= \prod_L \frac{1}{\sigma_j} \phi_L \left[\frac{R_{jt} + \alpha_{Lj} - X_j \Omega_j}{\sigma_j}\right] \\
&\times \prod_0 \left[\Phi_U \left(\frac{\alpha_{Uj} - X_j \Omega_j}{\sigma_j}\right) - \Phi_L \left(\frac{\alpha_{Lj} - X_j \Omega_j}{\sigma_j}\right)\right] \\
&\times \prod_U \frac{1}{\sigma_j} \phi_U \left[\frac{R_{jt} + \alpha_{Uj} - X_j \Omega_j}{\sigma_j}\right]
\end{aligned}
\tag{7.8}
$$

The code for estimating this procedure is in Appendix J.

Following consideration of the five-state unrotated model, a five-state rotated model is considered. This is essentially the rotated four-state model with zero-value company return observations excluded.

7.3 Results for Four- and Five-state Models

7.3.1 Unrotated Four-state Model

In these results, it was specified that each quadrant must have at least six observations. This cut the available number of company/event data sets down from 948 to 801. Further, as elsewhere in this study, the estimation period contained exactly 100 daily observations (while Norsworthy et al's sample contained almost 15 years of daily observations).[175] As a consequence, while Norsworthy et al obtained coefficient estimates with satisfyingly tiny probabilities of a Type 1 error, this was not the case on the New Zealand data here.[176]

Table 7-1 shows the summary of results for the unrotated four-state model on 100-day data sets. On average, none of the beta coefficients for the four quadrants furnish acceptable *p*-values, and

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[175] Norsworthy et al, p. 54, Table 5

[176] The results reported in Table 7-1 are recalculated on data sets with an estimation period of 500 days (which includes multiple prior dividend-and-earnings announcement events) and with the requirement that each quadrant must have at least ten observations. The result gained from this recalculation are in Appendix L. Interestingly, the *F*-statistic (38.41) is much higher, but the adjusted R^2 statistic (0.4534) is inferior to their equivalents in the first panel of Table 7-1.

only one of the four dummy variables modelling an intercept term for each quadrant managed to be significant at the five percent level of error. The actual number of data sets furnishing results supported at the five percent level of error is shown in Table 7-2. The difference in significance of first and third quadrant *p*-values between those in Table 7-1 may be caused by the relatively tiny estimation period used in the current study; but another possibility is that there are more close-to-zero returns in New Zealand, where trades are usually measured in steps of a cent. For the bulk of the NYSE, the standard step has been 12.5 cents.

However, the regression in Table 7-1 furnishes *F*-statistics which have a mean significance level of 0.0003, which is much less than a one percent probability of a Type 1 error, which suggests that it is still a valid vehicle for the compilation of expected returns.

It is clear that, if we depended upon individual regressors furnishing significant results, the 100-day estimation period would be too small for such a model — and data sets approaching the size of those of Norsworthy et al, or of Jokung and Meyfredi (2003) would need to be used. Returning to Table 7-1, a mean Durbin-Watson statistic of 1.9752 is reported. Given that there are seven explanatory variables (including quadrant dummies, but excluding the one that would be considered to be the intercept term), this falls between d_U (1.826) and 4-d_U (2.174) which indicates a null hypothesis of no auto-correlation present, on average, cannot be rejected. But this is also true of the results obtained from the unimproved Market Model, which are furnished in Table 7-3. However, Norsworthy et al make the point that Durbin-Watson statistics are not meaningful for models estimated on partitions.[177]

However, we are not primarily concerned as to whether any particular explanatory variable is — or is not — significantly different from zero; and the existence of serial correlation in a time series of returns based on adjusted closing share prices is not surprising news. What is important is the explanatory power of the expected returns computable from the procedure; hence the relevant output is the collective explanatory power of all of the independent variables, which is best captured by the adjusted R^2 statistic. In Table 7-1 the mean adjusted R^2 statistic is 0.507, which is more than a five-fold improvement on the unimproved Market Model result (0.0875) in Table 7-3. This compares with the rise in mean adjusted R^2 in Jokung and Meyfredi's (2003) results from 0.2747 for the Market Model to 0.6174 obtained by with respect to the four-state model — which is a two-fold increase. In the United States, Norsworthy et al recorded a three-fold rise from their Market Model output of 0.1646 to 0.5513 for the unrotated four-state model. The French and American figures are higher; but both of those studies used much longer data

[177] Norsworthy et al, p.23.

sets and made an adjustment for heteroskedasticity not made in the current study with its relatively miniscule 100-day estimation period.

Table 7-1: Summary Results for the Four-state Unrotated Model.

	Mean	Min	Max	St Dev
F	17.4150	1.6666	99.9218	9.1651
Sig. F	0.0003	0.0000	0.1270	0.0049
R^2	0.5419	0.1125	0.8838	0.1057
Adj R^2	0.5070	0.0450	0.8749	0.1138
Variance	0.0003	0.0000	0.0240	0.0011
Durbin-Watson	1.9752	1.1106	2.8961	0.2345
β_{Q1}	0.0077	-0.0053	0.0457	0.0054
t-Stat	2.2425	-2.2158	6.5781	1.2673
p-Value	0.1309	0.0000	1.0000	0.2134
β_{Q2}	-0.0188	-0.1907	0.0644	0.0143
t-Stat	-2.8572	-8.1719	1.3762	1.2535
p-Value	0.0623	0.0000	0.9759	0.1376
β_{Q3}	-0.0180	-0.1483	0.0316	0.0127
t-Stat	-3.2390	-9.7088	0.8619	1.3934
p-Value	0.0431	0.0000	0.9664	0.1177
β_{Q4}	0.0081	-0.0154	0.0609	0.0056
t-Stat	1.9219	-1.8510	5.5047	0.9394
p-Value	0.1481	0.0000	0.9473	0.1989
β_{Q1RMt}	0.4112	-3.1507	3.2349	0.6045
t-Stat	1.4331	-2.2886	11.5881	2.0204
p-Value	0.3311	0.0000	1.0000	0.3228
β_{Q2RMt}	0.0015	-25.0188	22.5279	1.6209
t-Stat	-0.0153	-4.7419	5.0626	0.9873
p-Value	0.5525	0.0000	0.9986	0.2898
β_{Q3RMt}	0.3723	-6.3126	11.9686	1.2274
t-Stat	1.0769	-3.2854	14.6847	2.1964
p-Value	0.4051	0.0000	0.9959	0.3299
β_{Q4RMt}	0.1455	-5.9558	4.8784	0.6480
t-Stat	0.2416	-3.7899	3.1998	0.8825
p-Value	0.5381	0.0003	0.9992	0.2772
N	801			

Norsworthy et al argued that the added explanatory power apparent in their American results could be sourced in the fact that the relationship between risk and return is not continuous, but discontinuous in its nature, and is reference-frame dependent. The quadrants depicted in Figure 7-1 effectively are those reference frames, which take account of not only bull and bear market movements, but bull and bear asset movements as well. Hence the four-state model allows for four reference frames where the Market Model allows for only one.

Table 7-2: Count of Coefficients with Better than Benchmark p-Values.

Coefficient	$N_{\alpha<0.05}$	%
β_{Q1}	464	57.93%
β_{Q2}	609	76.03%
β_{Q3}	659	82.27%
β_{Q4}	368	45.94%
β_{Q1RMt}	244	30.46%
β_{Q2RMt}	40	4.99%
β_{Q3RMt}	184	22.97%
β_{Q4RMt}	24	3.00%

Table 7-3: Unmodified Market Model Results.

	Mean	Min	Max	St Dev
F	15.1694	0.0000	490.8003	34.0293
Sig. F	0.2109	0.0000	0.9983	0.2837
R^2	0.0968	0.0000	0.8336	0.1385
Adj R^2	0.0875	-0.0102	0.8319	0.1400
Variance	0.0005	0.0000	0.0252	0.0011
Durbin-Watson	1.9900	0.8880	2.9990	0.2530
α **(Intercept)**	0.0001	-0.0101	0.0095	0.0020
t-Stat	0.1008	-3.0969	3.3023	1.0121
p-Value	0.4944	0.0013	0.9991	0.2919
β **(Slope)**	0.4720	-0.8982	2.7031	0.4441
t-Stat	2.6507	-2.7792	22.1540	2.8552
p-Value	0.2109	0.0000	0.9983	0.2837
N	948			

7.3.2 Rotated Four-state Model

When rotation is applied to the four-state model, the number of eligible company/event data sets rises from 801 to 871. This is because some observations have been relocated into another quadrant, which has allowed a further 70 data sets to pass the six-observations-per-quadrant entry requirement. The results are shown in Table 7-4.

The improvement that the rotated model makes on the unrotated model is its enhancement of explanatory power. In Table 7-4 the mean adjusted R^2 of the 871 procedures rises to 66.91%, which is very similar to the 63.70% obtained by Jokung and Meyfredi (2003) and to the 0.6508 recorded by Norsworthy et al (2004). These findings imply that in New Zealand in the 1990s (for the firms in the sample, anyway), the level of undiversifiable risk was only 33.09 percent of total risk, while in the two northern hemisphere countries it was only slightly higher at 36.30 percent and 34.92 percent.

Table 7-4: Rotated Four-state Model

	Mean	Min	Max	St Dev
F	34.9590	1.4631	172.7841	18.5193
Sig. F	0.0003	0.0000	0.1903	0.0065
R^2	0.6925	0.1002	0.9293	0.1040
Adj R^2	0.6691	0.0317	0.9239	0.1119
Variance	0.0002	0.0000	0.0243	0.0010
Durbin-Watson	2.0330	1.3532	2.8915	0.2242
β_{Q1}	0.0168	-0.0148	0.1444	0.0169
t-Stat	6.0566	-3.7773	20.2973	4.8962
p-Value	0.1813	0.0000	1.0000	0.3207
β_{Q2}	-0.0073	-0.1600	0.0347	0.0139
t-Stat	-2.6560	-20.2323	4.9730	4.3551
p-Value	0.3953	0.0000	1.0000	0.3715
β_{Q3}	-0.0151	-0.1755	0.0302	0.0160
t-Stat	-5.4031	-20.6226	3.1922	4.5976
p-Value	0.1978	0.0000	1.0000	0.3369
β_{Q4}	0.0074	-0.0319	0.1322	0.0142
t-Stat	2.4485	-3.6705	20.1584	4.1789
p-Value	0.4293	0.0000	1.0000	0.3826
β_{Q1RMt}	0.5315	-14.6208	13.9985	1.2477
t-Stat	1.4684	-7.7069	13.8035	2.3716
p-Value	0.2919	0.0000	1.0000	0.3290
β_{Q2RMt}	0.3009	-4.7648	3.5455	0.7723
t-Stat	1.2301	-6.7313	12.5343	2.3301
p-Value	0.3332	0.0000	1.0000	0.3384
β_{Q3RMt}	0.3571	-4.0804	13.5506	1.0173
t-Stat	1.0084	-10.6583	16.3956	2.2504
p-Value	0.3480	0.0000	1.0000	0.3323
β_{Q4RMt}	0.3560	-9.4844	4.7017	0.8524
t-Stat	1.3550	-6.9350	14.8079	2.4070
p-Value	0.3698	0.0000	1.0000	0.3524
N	871			

In addition, the mean *F*-statistic has doubled in size from, 17.4150 in Table 7-1 to 34.959, which is still strongly significant (p = 0.0003). However, on samples of only 100 days of observations, none of the mean (individual) coefficients are statistically significant. The count of estimation sets furnishing p-values within the five percent benchmark level of error is given in Table 7-5. Although the mean p-values reported in Table 7-4 are worse (in significance rating) than those of Table 7-1, the counts of data sets furnishing p-values with less than a five-percent error are much higher with respect to the rotated model in Table 7-5 than with respect to the unrotated model in Table 7-4. Norsworthy et al concluded of the rotated four-state model, that it gained its explanatory power from taking the psychology of decision-making into account. This was achieved by the translation of observations into 'expectations space' by the rotation procedure.

Table 7-5: Number of significant Coefficients in the Rotated Four-state Model.

Coefficient	$N_{\alpha<0.05}$	%
β_{Q1}	612	70.26%
β_{Q2}	305	35.02%
β_{Q3}	604	69.35%
β_{Q4}	292	33.52%
β_{Q1RMt}	346	39.72%
β_{Q2RMt}	298	34.21%
β_{Q3RMt}	250	28.70%
β_{Q4RMt}	262	30.08%

7.3.3 Unrotated Five-state Model

The five-state model does not add a fifth quadrant (which would be a logical impossibility); but it does specifically allow for the existence of zero-value company returns (whether they be for profitless liquidity trading or for the absence of trading) as a separate item in the estimation process. The zero-value returns are, in fact, ignored and sidelined in the estimation of model parameters because they are equated with a parameter value of zero — which does not need to be calculated in the five-state model's OLS procedure. Again it is the results from data sets with standard 100-day estimation periods that are reported here in Table 7-6; and there is no separate section in it for the fifth state on the ground that no coefficient for zero-value returns needed to be calculated. The minimum number of observations per quadrant was again set at six.

In Table 7-6 the mean adjusted R^2 has risen to 0.7038 while the mean F-statistic has risen to 41.1681 (p = 0.0001). Also, all of the alpha coefficients (β_{Q1} to β_{Q4}) are now significant, although, in keeping with the output of previous tables, the coefficients of the last four regressor variables yield very high mean p-values.

Table 7-6: Unrotated Five-state Model

	Mean	Min	Max	St Dev
F	41.1681	2.0995	259.3885	25.3281
Sig. F	0.0001	0.0000	0.0512	0.0020
R^2	0.7248	0.1377	0.9518	0.0913
Adj R^2	0.7038	0.0721	0.9481	0.0982
Variance	0.0002	0.0000	0.0233	0.0010
Durbin-Watson	0.7038	0.0721	0.9481	0.0982
β_{Q1}	0.0191	-0.0027	0.0858	0.0111
t-Stat	5.0497	-1.1385	14.7262	2.2317
p-Value	0.0168	0.0000	0.8336	0.0755
β_{Q2}	-0.0180	-0.1907	0.0644	0.0129
t-Stat	-3.8043	-12.6067	1.6573	1.8823
p-Value	0.0404	0.0000	0.9698	0.1174
β_{Q3}	-0.0174	-0.1046	0.0054	0.0110
t-Stat	-4.2656	-13.1718	0.4598	1.9779
p-Value	0.0233	0.0000	0.8617	0.0883
β_{Q4}	0.0193	-0.0398	0.1444	0.0125
t-Stat	3.7861	-2.6683	14.1754	1.8704
p-Value	0.0376	0.0000	0.8847	0.1091
β_{Q1RMt}	0.3399	-4.9684	10.3119	1.0392
t-Stat	1.2948	-4.9821	18.1636	2.4797
p-Value	0.3006	0.0000	0.9992	0.3116
β_{Q2RMt}	-0.0176	-25.0188	22.5279	1.5840
t-Stat	-0.0329	-6.9352	4.4421	1.2581
p-Value	0.4794	0.0000	0.9964	0.3044
β_{Q3RMt}	0.3401	-6.3126	9.7080	1.0327
t-Stat	1.3802	-3.6012	21.3650	2.8233
p-Value	0.3382	0.0000	0.9940	0.3265
β_{Q4RMt}	0.1286	-18.4549	10.8864	1.5231
t-Stat	0.1648	-8.1499	5.1878	1.2999
p-Value	0.4454	0.0000	0.9991	0.2997
N	733			

The actual OLS output for the first company/event data set is reported along with the matching friction model output in Table 7-8. In this table, the final four betas produced by the OLS regression procedure and by the friction model maximum likelihood estimation procedure are identical. However, the first four are not identical until they are reconciled by adjusting each of the friction model beta estimates by subtraction of the relevant alpha estimate.

Table 7-7: Number of Significant Coefficients in the Unrotated Five-state Model.

Coefficient	$N_{\alpha<0.05}$	%
β_{Q1}	690	94.13%
β_{Q2}	626	85.40%
β_{Q3}	665	90.72%
β_{Q4}	624	85.13%
β_{Q1RMt}	257	35.06%
β_{Q2RMt}	79	10.78%
β_{Q3RMt}	225	30.70%
β_{Q4RMt}	87	11.87%

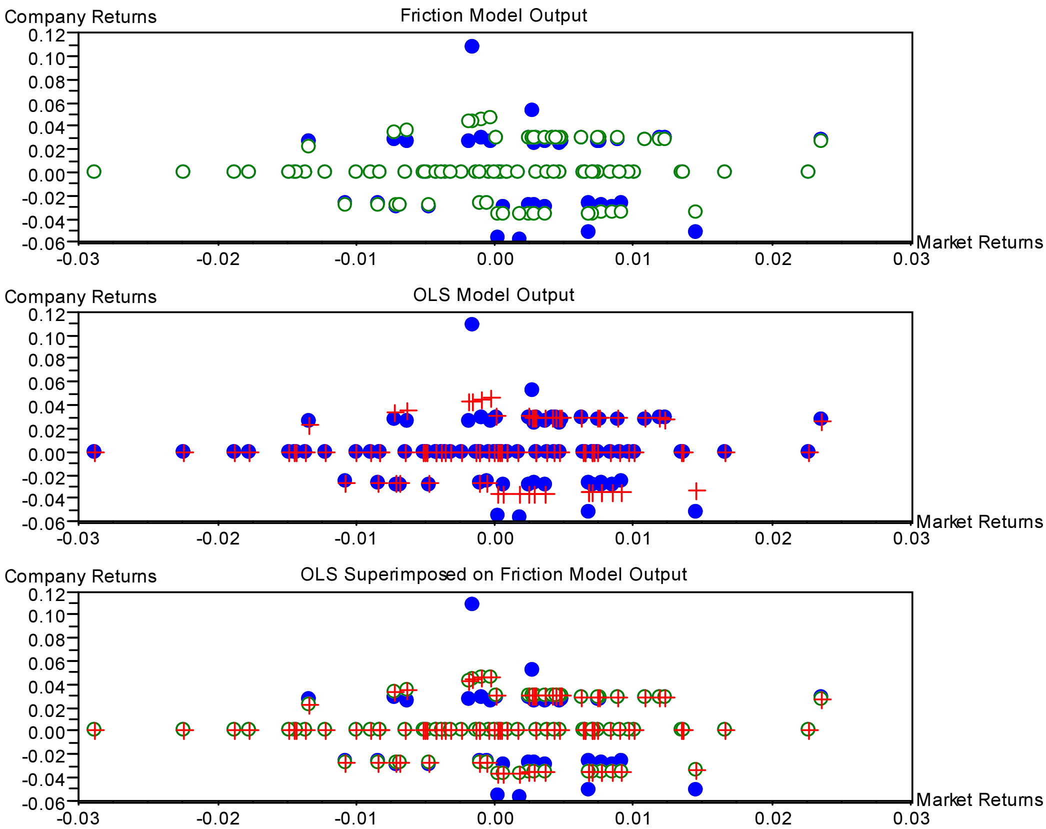
Table 7-8: Reconciliation of the Five-state model and the Five-state Friction Model.

	OLS	MLE	Reconciliation	
			(MLE)	(MLE)
σ		0.01296		
a_L		-0.1116		
α_U		0.12191		
β_{Q1}	0.03043	0.15234	0.030429	β_{Q1}-α_U
β_{Q2}	-0.0366	-0.1483	-0.03661	β_{Q2}-α_L
β_{Q3}	-0.0271	-0.1388	-0.02713	β_{Q3}-α_L
β_{Q4}	0.04679	0.1687	0.046786	β_{Q1}-α_U
β_{Q1RMt}	-0.1639	-0.1639		
β_{Q2RMt}	0.2112	0.2112		
β_{Q3RMt}	0.03762	0.03762		
β_{Q4RMt}	1.81173	1.81173		

The presence of the zero-value region between the upper and lower alphas is made explicit in the friction model output.

Further evidence of the fact that the two estimation procedures produce identical results can be seen in Figure 7-5 in which the friction model result is plotted against the distribution of observed company returns against market index returns in the first panel, the OLS regression result is plotted in the second, and the two are superimposed in the third.

Figure 7-5: Comparison of Estimation Methods for Five state Models: Friction and OLS.

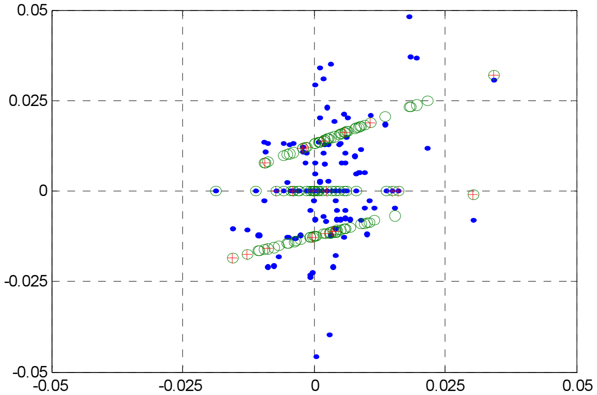
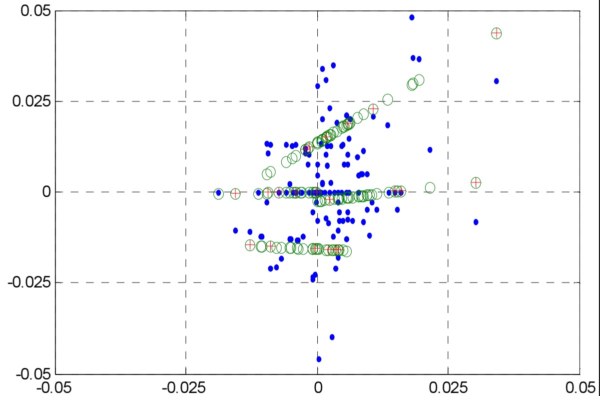
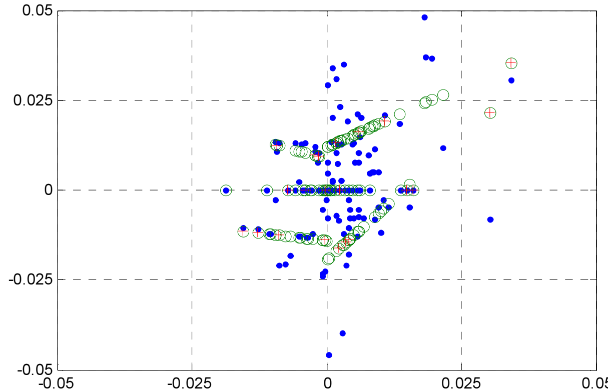
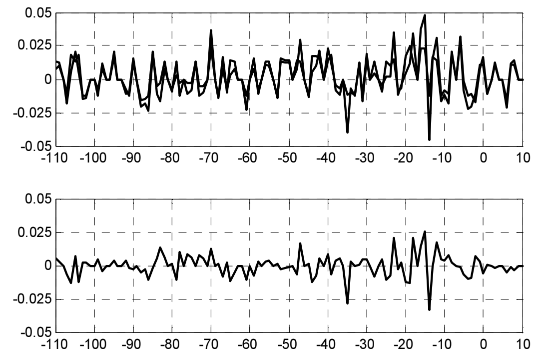
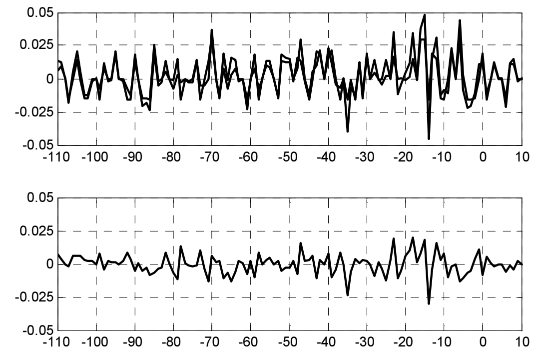
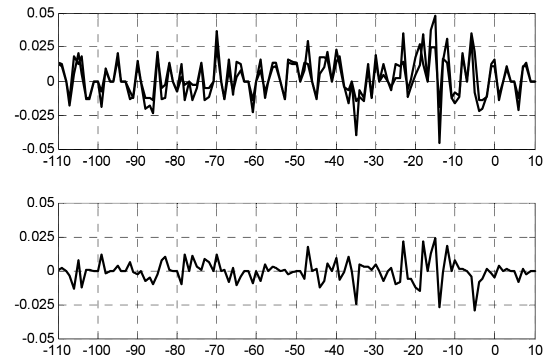


The five-state unrotated model appears to be an improvement on the four-state rotated and unrotated models. Because of that it is of interest to explore the nature of the ARs generated by it. In Figure 7-6, day zero ARs are plotted by dividend-and-earnings classification.

In Table 7-9, the summary statistics for the expected returns of four models are provided in tabular format. These comprise the unrotated and rotated versions of the four-state model, the unrotated five-state model, and the three-state model. Beneath them is a graphical illustration provided by the Cavalier Corporation's combined estimation period and test period data set with respect to its end-of-year announcement dated 26th August 1993. The upper graphical panel shows market returns on the horizontal axis versus company returns on the vertical axis. The hollow circles represent the fitted lines for the various states with respect to this single representative company/event data set. The bottom pair of time series panels consists of returns and expected returns in the upper panel, and a plot of abnormal returns in the lower panel. This company/event did not furnish a significant abnormal return on the day of the announcement in spite of raising its dividend by one cent from 12 to 13 cents, and increasing its EPS (as calculated from earnings after tax and before extraordinaries divided by the number of ordinary shares outstanding) from 32.3 cents a share to 33.6 cents per share.

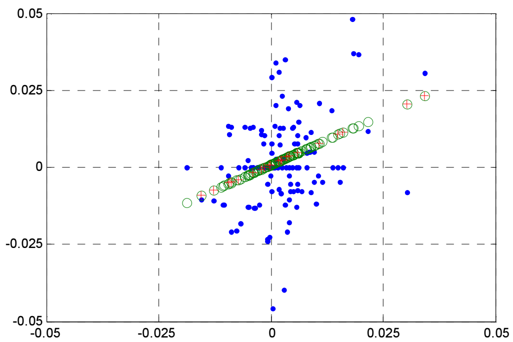
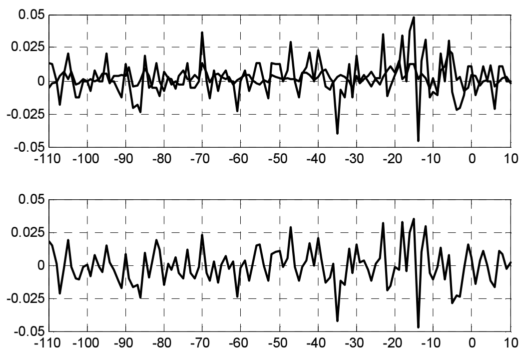
Of particular interest in the top panel are the comparative figures titled '% Norm'.

Table 7-9: State Model Expected Returns with Mean summary Statistics and Graphical Illustration provided by Cavalier Corporation, 26th August 1993

Model	3 State	4 State		Unrotated 5 State
		Unrotated	Rotated (graphed)	
States	$R_j<0$; $R_j=0$; $R_j>0$	$R_M\geq0$,and $R_j\geq0$; $R_M\geq0$ and $R_j<0$; $R_M<0$ and $R_j<0$; $R_M<0$and $R_j\geq0$		$R_j=0$; $R_M\geq0$ and $R_j>0$; $R_M\geq0$ and $R_j<0$; $R_M<0$ and $R_j<0$; $R_M<0$ and $R_j>0$
N	900	801	871	733
F	88.0833	17.4150	34.9590	41.1681
Sig. F	0.0000	0.0003	0.0003	0.0001
Adj R^2	0.6908	0.5070	0.6691	0.7038
% Norm	51.56%	17.48%	21.15%	58.00%
Example Returns Graph Market return horizontal axis. Company returns vertical Axis.				
Example Time Series Graph. R dotted. E(R) solid. 2nd chart residuals / ARs.				

This percentage records the incidence of datasets (out of the total number of datasets employed) which furnished residuals in the procedure that were normally distributed according to the Lilliefors test with a five percent error. The three-state model actually furnishes residuals that perform better, with respect to a normal distribution, than either of the four-state models. Of the three-state model's datasets, 51.56 percent furnish normally-distibuted residuals, while only about one third of that percentage (17.48 percent) of the unrotated four-state model's datasets do likewise. The rotated four-state model fares not quite so badly with 21.15 percent; but the unrotated five-state model furishes better record with 58.0 percent. The basic Market Model, on the other hand, managed 20.57 percent, which is reported in Table 7-10.

Table 7-10: Market Model Mean Statistics and Cavalier Corporation, 26th August 1993.

Model	**Market Model**
States	$-\infty<R_M<\infty$ and $-\infty<R_j<\infty$
N	948
F	15.1694
Sig. F	0.2109
Adj R²	0.0875
% Norm	20.57%
Mean α	0.0001
Mean β	0.4720
Example Returns Graph. Market return horizontal axis. Company returns vertical Axis.	
Example Time Series Graph R_{jt} dotted. $E(R_j)$ solid. 2nd chart residuals / ARs	

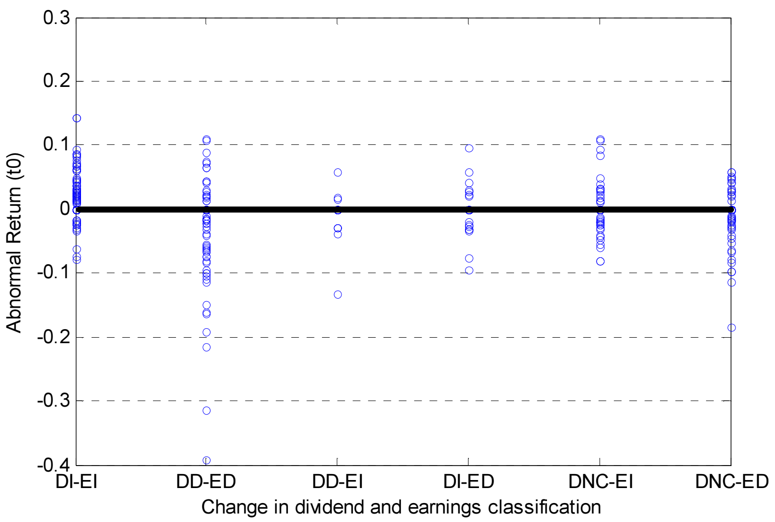
In both Table 7-9 and Table 7-10, it is of interest how closely the solid line of the expected return series approximates the dotted line of the observed returns in the upper time-series panels.

It is not possible to spot significant differences in the quality of these fits from model to model, by eye. All of them are much closer fits than that provided by the basic Market Model.

With respect to the expected returns in the upper time series panel, it is clear that the fitted line does a much poorer job of approximating the path of the observed returns depicted as the dotted series. In the lower time series panel, there is some evidence of a positive abnormal return on day t_0, but it is dwarfed by both positive and negative abnormal returns in the preceding thirty days.

I now turn to the record provided by the abnormal returns furnished by the unrotated five-state model.

Figure 7-6: Day Zero Abnormal Returns outside a 90% Confidence Interval.



For each 100-day company/event estimation period, the ARs used in Figure 7-6 were collected and a two-tailed 90 percent confidence interval was calculated. If the day zero AR fell outside these limits, it was plotted in the figure, while the rest (being generally closer to zero — allowing for some distributions to have larger variances than others) were suppressed. One would expect to see a dispersion of ARs above and below zero for each of the mixed news announcement combinations; but this occurs with respect to the good news and bad news combinations as well.

Table 7-11: Count and Percentage of Day Zero Abnormal Returns (AR_{t0}).

DPS-EPS Class	Negative		Zero		Positive		Total
DI-EI	77	(32%)	52	(22%)	110	(46%)	239
DD-ED	58	(41%)	31	(22%)	51	(36%)	140
DD-EI	11	(34%)	8	(25%)	13	(41%)	32
DI-ED	26	(42%)	14	(23%)	22	(35%)	62
DNC-EI	44	(42%)	24	(23%)	38	(36%)	106
DNC-ED	67	(44%)	36	(23%)	51	(33%)	154
Total	283	(39%)	165	(23%)	285	(39%)	733

In Table 7-11 all ARs (ignoring the confidence interval) are classified by announcement type and the percentage by sign of each is computed for each row. For instance, in the DI-EI row, 32 percent are positive, 22 percent are zero (in accordance with an observed return on the day being zero), and 46 percent are negative.

It is interesting, in terms of the five-state unrotated model, that 32 percent of the ARs in the DI-EI category are negative while only 46 percent are positive. One would predict from this that this interaction effect will lapse into insignificance when the restricted least squares regression procedure standard to this study is performed on this model's output data. Further, the zero column is fairly consistent over the categories, ranging from a minimum of 22% to a maximum of 25%; and for all mixed news categories, the percentage of positive ARs is greater (smaller) than the percentage of negative ARs whenever earnings increase (decrease).

Table 7-12: Three-day Event Window CARs (CAR3Day).

DPS-EPS Class	Negative	Zero	Positive	Total
DI-EI	98 (41%)	6 (3%)	135 (56%)	239
DD-ED	78 (56%)	6 (4%)	56 (40%)	140
DD-EI	13 (41%)	2 (6%)	17 (53%)	32
DI-ED	25 (40%)	3 (5%)	34 (55%)	62
DNC-EI	57 (54%)	5 (5%)	44 (42%)	106
DNC-ED	95 (62%)	7 (5%)	52 (34%)	154
Total	366 (50%)	29 (4%)	338 (46%)	733

When the event window is expanded to three days, the three-day CARs follow the pattern shown in Table 7-12. The zero-value observations drop to an average of four percent; and the positive CARs for the good news announcements outweigh the negative CARs by 56% to 41%, while the ratio is almost exactly reversed with respect to the bad news category (56% negative to 40% positive). However, the mixed-news categories furnish a more complex relationship between positive and negative ARs. For both DNC categories, the negatives outweigh the positives. This implies that no change in dividend certainly dampens any signal sent by an associated rise in earnings, but it certainly appears not to dampen down the negative signal sent by an associated fall in announced earnings. In the case of the DI-ED category, the rise in announced dividend would appear to garner more positive ARs than the drop in earnings gathers negatives. However, in the case of the DD-EI category, the positives outweigh the negatives, suggesting that changes in earnings might just be more important in investors' trading decisions than changes in announced dividend.

7.3.4 Rotated Five-state Model

In Table 7-13 the results of the rotated five-state model are furnished. Again the requirement was imposed that each quadrant (with rotated axes) must contain at least six observations. The results are not as good as the five-state unrotated model. The mean *F*-statistic has dropped to 21.7974 (p = 0.0006). Further, the mean adjusted R^2 statistic has dropped to 0.6559.

Table 7-13: Rotated Five-state Model.

	Mean	Min	Max	St Dev
F	21.7974	1.5961	107.3135	10.1210
Sig. F	0.0006	0.0000	0.1512	0.0084
R^2	0.6929	0.1394	0.9567	0.0917
Adj R^2	0.6559	0.0520	0.9478	0.1022
Variance	0.0003	0.0000	0.0250	0.0016
Durbin-Watson	2.0663	1.2583	2.8851	0.2829
β_{Q1}	0.0145	-0.0967	0.1789	0.0198
t-Stat	4.6501	-4.8495	13.6350	4.3093
p-Value	0.0713	0.0000	0.9344	0.1700
β_{Q2}	-0.0025	-0.1625	0.0634	0.0185
t-Stat	-1.3927	-11.6375	5.8011	3.7807
p-Value	0.2357	0.0000	0.9977	0.3065
β_{Q3}	-0.0131	-0.1704	0.0928	0.0190
t-Stat	-3.9918	-13.7438	3.9853	3.7239
p-Value	0.0932	0.0000	0.9965	0.2156
β_{Q4}	0.0030	-0.0529	0.1523	0.0189
t-Stat	1.4260	-6.1434	12.2117	3.7754
p-Value	0.2457	0.0000	0.9985	0.3009
β_{Q1RMt}	0.1715	-10.0202	7.5897	1.0323
t-Stat	0.4069	-5.1202	4.6464	1.4750
p-Value	0.4139	0.0000	0.9987	0.3267
β_{Q2RMt}	0.0747	-5.6376	4.5934	0.9943
t-Stat	0.0211	-4.0223	8.3696	1.3371
p-Value	0.4544	0.0000	0.9989	0.3124
β_{Q3RMt}	0.0923	-5.6592	11.6250	1.1012
t-Stat	0.1579	-8.0975	4.5621	1.3606
p-Value	0.4484	0.0000	0.9980	0.3017
β_{Q4RMt}	0.0856	-4.3345	4.7797	0.8784
t-Stat	0.0549	-4.2238	6.6607	1.1633
p-Value	0.5088	0.0000	0.9993	0.3172
N	442			

The question is begged — why does the five-state rotated model not offer an improvement over the five-state unrotated model when the rotated four-state model definitely appears to be an improvement over the unrotated four-state model? The answer appears to lie in the fact that in the five-state models, the zero-value company return observations have been separated out, whereas they remain embedded in the four-state models. In the unrotated four-state model, the specification of membership of a given quadrant was stated in Figure 7-1. But it turns out that the explanatory power of this model depends on where the zero-value company returns are shunted.

When the $R_{At} \geq 0$ for the first quadrant was changed to $R_{At} > 0$, and the $R_{At} < 0$ for the second quadrant was changed to $R_{At} \leq 0$ with everything else left as in Figure 7-1, the rotated four-state model's mean adjusted R^2 statistic rose from 0.5070 to 0.5510. This change was effectively brought about by shifting the zero-value company returns from the first quadrant to the second. Rather than improve further when this change was left in place and a similar switch was made to shift zero-value company returns from the fourth quadrant into the third, the mean adjusted R^2 dropped slightly to 0.5351.

7.3.5 RLS Regressions employing Abnormal Returns with Respect to Event Window Dividend and Earnings Data

Abnormal returns were then created from the expected returns of the rotated four-state model and used in the RLS regression procedures reported in this subsection. The ARs obtained from the rotated four-state model showed very little significant connection with changes in dividend per share or with changes in earnings per share at all. This result is reported in Table 7-14. The only significant relationship is furnished by the first-order variable, ΔEPS on the full sample in the fourth column where the dependent variable is $AR t_0$. This relationship is only weakly significant, since the p-value fails to come within the five percent benchmark probability of error; but the first-order F-statistic at the foot of this column does confirm it within the five percent error level. However, this result is very tenuous as the unrestricted equation itself has an F-statistic whose supporting p-value is only significant within the ten percent level of error. The number of days a firm trades does not appear to make any difference in the light of this model.

It is of interest that nowhere in the table does the first-order variable, ΔDPS achieve any degree of importance at all. Its p-values are, everywhere, utterly inconsequential. The rotated four-state model furnishes no evidence of the existence of a dividend signal.

Table 7-14: RLS Regression Results employing ARs from the Rotated Four-state Model

Regressand	AR3Day			ARt_0		
Sample by Days Traded	All Obs.	100 Days	<100 Days	All Obs.	100 Days	<100 Days
Coefficient (p-Values)						
DD-ED (INTERCEPT	0.0024638 (0.2379)	-0.005749 (0.1097)	0.005274 (0.0356)	-0.000563 (0.6133)	-0.002928 (0.1706)	0.0003207 (0.8077)
ΔDPS	-0.000388 (0.1241)	0.0001972 (0.7672)	-0.000396 (0.1568)	-0.00018 (0.1819)	7.68E-05 (0.8464)	-0.000194 (0.1855)
ΔEPS	-3.95E-06 (0.9737)	-0.000668 (0.0567)	7.929E-05 (0.5467)	-0.000122 (0.0569)	-0.000207 (0.3186)	-0.000108 (0.1191)
DI-EI	-0.001126 (0.6839)	0.0063497 (0.1920)	-0.003885 (0.2391)	0.0010718 (0.4681)	0.0029082 (0.3148)	0.0002614 (0.8802)
DD-EI	-0.001324 (0.7604)	0.0058967 (0.3624)	-0.001674 (0.7617)	-0.001643 (0.4786)	0.0043177 (0.2627)	-0.00396 (0.1728)
DI-ED	0.0024163 (0.4938)	0.0007407 (0.9122)	0.0013174 (0.7495)	0.0029342 (0.1200)	0.0071505 (0.0750)	0.0015994 (0.4609)
DNC-EI	-0.001324 (0.6513)	0.0049815 (0.2886)	-0.003248 (0.3659)	0.000773 (0.6213)	0.0029035 (0.2985)	-3.66E-06 (0.9985)
DNC-ED	-0.005227 (0.0491)	0.0035196 (0.4185)	-0.008633 (0.0076)	-0.00086 (0.5439)	0.0024422 (0.3456)	-0.002152 (0.2049)
Observations Count R^2 Statistics, F-Statistics and p-Values						
N	808	190	618	808	190	618
$R^2_{UNRESTRICTED}$	0.0149	0.0276	0.0258	0.0153	0.0276	0.0203
$R^2_{EQUATION\ (ii)}$	0.0055	0.0142	0.0087	0.0075	0.0070	0.0100
$R^2_{EQUATION\ (iii)}$	0.0119	0.0076	0.0224	0.0072	0.0222	0.0122
$F_{UNRESTRRICTED}$	1.7297 (0.0988)	0.73863 (0.6395)	2.3078 (0.0250)	1.7755 (0.0890)	0.73761 (0.6403)	1.8065 (0.0834)
$F_{EQUATION\ (ii)}$	2.2069 (0.1107)	1.3462 (0.2627)	2.6882 (0.0688)	3.0342 (0.0487)	0.65933 (0.5184)	3.0921 (0.0461)
$F_{EQUATION\ (iii)}$	1.926 (0.0877)	0.28292 (0.9220)	2.8005 (0.0164)	1.1643 (0.3250)	0.83541 (0.5261)	1.517 (0.1824)
$F_{FIRST\ ORDER}$	1.2371 (0.2908)	1.8706 (0.1570)	1.0736 (0.3424)	3.2706 (0.0385)	0.5067 (0.6033)	2.5127 (0.0819)
$F_{INTERACTION}$	1.5390 (0.1752)	0.5024 (0.7742)	2.1434 (0.0588)	1.2641 (0.2774)	0.7713 (0.5716)	1.2897 (0.2666)

7.3.5.1 Results from the Five-state Unrotated Model

The results from the unrotated five-state model, however, do show a slightly greater degree of association between the ARs furnished from this model's expected returns and day zero announcement phenomena. Observe the interaction dummy effects first. Although the good-news and bad-news announcement combinations managed to achieve significance in the unrestricted equation in the first and third columns of Table 7-15 with respect to a three-day event window, this significance was left unconfirmed since the interaction *F*-statistics steadfastly remained insignificant. However, with respect to a one-day window, the interaction *F*-statistics did endorse the DI-EI and DD-ED effects within a ten percent level of error. Indeed, in the result reported for the unrestricted procedure, the DI-EI interaction effect was significant at the one-percent level of error.

Table 7-15: RLS Regression Results employing ARs from the Unrotated Five-state Model

Regressand	AR3Day			ARt_0		
Sample by Days Traded	All Obs.	100 Days	<100 Days	All Obs.	100 Days	<100 Days
Coefficient (p-Values)						
DD-ED (INTERCEPT	-0.016471 (0.0099)	-0.010092 (0.1282)	-0.01991 (0.0193)	-0.009744 (0.0122)	-0.005328 (0.2577)	-0.012224 (0.0163)
ΔDPS	0.001132 (0.2658)	-0.000476 (0.6950)	0.0014469 (0.2631)	0.0004019 (0.5163)	-0.000692 (0.4235)	0.0006853 (0.3750)
ΔEPS	0.0005994 (0.0935)	0.0005587 (0.3864)	0.0005627 (0.1836)	0.0007405 (0.0007)	0.0002144 (0.6397)	0.000754 (0.0030)
DI-EI	0.022512 (0.0082)	0.0075617 (0.4003)	0.028658 (0.0110)	0.015933 (0.0021)	0.010809 (0.0915)	0.018736 (0.0055)
DD-EI	0.020244 (0.0953)	-0.011011 (0.3693)	0.035736 (0.0307)	0.0059541 (0.4199)	-0.016117 (0.0653)	0.018163 (0.0660)
DI-ED	0.017855 (0.0890)	0.012926 (0.2823)	0.021331 (0.1148)	0.0083733 (0.1901)	0.0015556 (0.8553)	0.011618 (0.1506)
DNC-EI	0.016161 (0.0631)	0.0082175 (0.3488)	0.0204 (0.0818)	0.0099998 (0.0589)	0.0040806 (0.5123)	0.01334 (0.0570)
DNC-ED	0.014906 (0.0615)	0.011564 (0.1615)	0.017021 (0.1081)	0.006491 (0.1808)	0.0028665 (0.6244)	0.0082179 (0.1941)
Observations Count R^2 Statistics, F-Statistics and p-Values						
N	733	198	535	733	198	535
$R^2_{\text{UNRESTRICTED}}$	0.0438	0.0280	0.0551	0.0681	0.0562	0.0839
$R^2_{\text{EQUATION (ii)}}$	0.0334	0.0061	0.0391	0.0540	0.0032	0.0661
$R^2_{\text{EQUATION (iii)}}$	0.0363	0.0240	0.0474	0.0493	0.0527	0.0623
$F_{\text{UNRESTRRICTED}}$	4.7432 (0.0000)	0.78282 (0.6025)	4.3924 (0.0001)	7.5655 (0.0000)	1.6176 (0.1325)	6.8921 (0.0000)
$F_{\text{EQUATION (ii)}}$	12.614 (0.0000)	0.59398 (0.5531)	10.825 (0.0000)	20.851 (0.0000)	0.31293 (0.7317)	18.842 (0.0000)
$F_{\text{EQUATION (iii)}}$	5.4792 (0.0001)	0.94529 (0.4529)	5.2643 (0.0001)	7.5335 (0.0000)	2.1358 (0.0629)	7.0298 (0.0000)
$F_{\text{FIRST ORDER}}$	2.8229 (0.0601)	0.3923 (0.6761)	2.1576 (0.1166)	7.3353 (0.0007)	0.3533 (0.7029)	6.2026 (0.0022)
$F_{\text{INTERACTION}}$	1.5732 (0.1653)	0.8595 (0.5095)	1.7874 (0.1136)	2.1843 (0.0542)	2.1372 (0.0628)	2.0395 (0.0717)

As in Table 7-14, the Table 7-15 results furnish no evidence of any meaningful degree of association between the regressand and the first-order variable, Δ*DPS*. On the other hand, Δ*EPS* becomes more strongly significant in the unrotated five-state model results — when the event window is restricted to a single day. In the unrestricted procedure results on the one-day window, and in the associated first-order *F*-statistic, Δ*EPS* in columns four and six has *p*-values that indicate less than a one percent level of error. But this significance disappears when the sample is cut down to include only shares that trade every day during the 100-day expected return estimation period. The unrotated five-state model does not furnish results that support the existence of a dividend signal.

7.4 Five State-two Step Model

The five state-two step model attempts to overcome the problems of spikes in the data and low-return liquidity trades by performing a second regression on those data-points that fall within an 80% confidence interval of the estimated fit calculated in a first regression. However, if the estimation period is kept at 100 days and the minimum membership requirement for each state is six points, this drops the dataset down to 196 usable announcement events. This is just too few. However, the method has potential for future studies and so is included. Table 7-16 reports the results.

The most noteworthy item in the table is the F-statistic of 281.29 which is over ten times larger than the 17.42 furnished by the unrotated four-state model in Table 7-1. Also the average adjusted R^2 is very high at 87.96%, but this is for those points included in the second regression. But while the four quadrant dummy coefficients (β_{Q1} to β_{Q4}) are all significant, the coefficients of the four market return variables by quadrant remain insignificant. Nevertheless, in terms of potentially furnishing expected returns with a high explanatory power with respect to the set of observed returns they were calculated upon, this model appears to perform well.

Table 7-16: Five-state Two Step Model

	Mean	Min	Max	St Dev
F	281.2937	29.1768	22190.9404	1620.4579
Sig. F	0.0000	0.0000	0.0000	0.0000
R^2	0.8796	0.7194	0.9994	0.0562
Adj R^2	0.8689	0.6971	0.9994	0.0609
Variance	0.0000	0.0000	0.0001	0.0000
Durbin-Watson	0.8689	0.6971	0.9994	0.0609
β_{Q1}	0.0157	0.0026	0.0682	0.0086
t-Stat	9.3389	1.5916	155.6824	11.9216
p-Value	0.0016	0.0000	0.1125	0.0100
β_{Q2}	-0.0143	-0.0655	0.0005	0.0089
t-Stat	-7.3238	-109.8934	0.1042	9.703
p-Value	0.0105	0.0000	0.3957	0.0451
β_{Q3}	-0.0136	-0.0399	-0.0017	0.0073
t-Stat	-7.855	-115.5873	-0.9866	10.2569
p-Value	0.0056	0.0000	0.2439	0.0264
β_{Q4}	0.0159	-0.0006	0.0691	0.0094
t-Stat	7.3413	-0.197	90.6174	8.2635
p-Value	0.0072	0.0000	0.3901	0.0393
β_{Q1RMt}	0.4205	-2.7074	9.0822	1.1646
t-Stat	2.1581	-9.6728	27.2392	4.5728
p-Value	0.1057	0.0000	0.3976	0.1341
β_{Q2RMt}	-0.0124	-3.1619	2.9407	0.8333
t-Stat	-0.1603	-14.0238	6.189	2.3501
p-Value	0.2070	0.0000	0.3978	0.1531
β_{Q3RMt}	0.3674	-1.6456	4.7334	0.7884
t-Stat	2.4016	-11.3507	39.7859	5.8324
p-Value	0.1424	0.0000	0.3978	0.1537
β_{Q4RMt}	0.115	-3.8245	3.6846	0.9681
t-Stat	0.3231	-8.3161	6.2714	2.0928
p-Value	0.1847	0.0000	0.3977	0.1450
N	196			

7.5 Three-state Asset Pricing Models

7.5.1 Three-state Methodology

It may at first appear that spending time looking at a three-state model is a retrograde step — but it is not. It is interesting in that it has a mean explanatory power (on the study's New Zealand datasets) of 69.08 percent which is almost as good as the 70.38 percent furnished by the unrotated five-state model. This does suggest that it might be more useful as a compiler of expected returns than either of the four-state models. More important, it is the precursor for a more important model, which is the three-state two-step model. The three states of the simple three-step model are $R_{jt} > 0$, $R_{jt} = 0$, and $R_{jt} < 0$; and it makes use of two dummy variables. These are Q_1, which takes on the value '1' when R_{Mt} is positive, and zero otherwise, and Q_2, which takes on the value '1' only when R_{Mt} is negative. $\beta_1 Q_1$ is simply the intercept term.

$$R_{jt} = \beta_1 Q_1 + \beta_2 Q_2 + \beta_3 Q_1 R_{Mt} + \beta_4 Q_2 R_{Mt} + \varepsilon_{jt} \qquad (7.9)$$

The results for the simple three-state model are furnished in Table 7-17 and were summarised in Table 7-9 for comparison with the quadrant-based models.

Table 7-17: Three-state Model.

	Mean	Min	Max	St Dev
F	88.0833	3.2410	547.2592	49.4516
Sig. F	0.0000	0.0000	0.0254	0.0009
R^2	0.7001	0.0920	0.9448	0.0992
Adj R^2	0.6908	0.0636	0.9430	0.1023
Variance	0.0002	0.0000	0.0235	0.0010
Durbin-Watson	2.0536	1.3239	2.9193	0.2313
β_{Q1}	0.0221	0.004	0.1322	0.0131
t-Stat	9.8019	1.5455	24.8586	3.0816
p-Value	0.0003	0.0000	0.1255	0.0048
β_{Q2}	-0.0207	-0.1209	-0.0032	0.0119
t-Stat	-9.5527	-25.5416	-1.5552	3.0023
p-Value	0.0004	0.0000	0.1232	0.0058
β_{Q1RMt}	0.2655	-7.813	13.3441	0.8105
t-Stat	1.3837	-7.0841	12.7892	2.3042
p-Value	0.2625	0.0000	1.0000	0.2990
β_{Q2RMt}	0.1964	-4.7648	7.7104	0.7138
t-Stat	1.2105	-7.0163	17.7741	2.6451
p-Value	0.3136	0.0000	0.9964	0.3175
N	900			

Given that there had to be at least six observations in the positive region and six in the negative region, the number of estimation data sets dropped from 948 to 900. But 900 is actually quite a large number of datasets — and much larger than the 733 eligible sets employed in the unrotated five-state model estimation. Effectively the three-step model can run on more thinly-traded firms' datasets. However, the explanatory power of the individual beta coefficients, β_{Q1RMt} and

β_{Q2RMt} is low, with neither typically achieving significance within any acceptable benchmark level for a Type 1 error. However, the same can be found on the coefficients furnished by the basic Market Model in Table 7-3 on page 194.

7.5.2 Three-state Two Step Model

What I now propose is a three-state two-step model. This is a definite improvement on all of the models discussed and estimated so far in this chapter. In the manner of the five-state two-step model already mentioned, the first step is just the estimation of the state model (here the three-state model). The second step entailed screening out observations that fell outside an 80 percent confidence interval associated with fitted lines for each of the states and then re-estimating the three-state model regression.

The employment of an 80 percent confidence interval was decided upon after looking at a number of graphs using different confidence intervals — but is basically arbitrary. The decision criterion in the confidence interval decision was to retain suffcicient data points while screening out two sorts of distorting observations. The first sort consisted of near-zero company returns (from liquidity trading) associated with moderate to large positive and negative values of return on the market (R_{Mt}). The second sort were high-value (in absolute terms) outliers. (Zero-value return observations have already been filtered out by being assigned the 'third' state.) In common with other state model specifications, each state had to have at least six observations for a dataset to be eligible for inclusion in the procedure.

7.5.3 Three-state Two Step Model Results

The first thing of note in in Table 7-18 is that the mean *F*-statistic is extremely high (451.71) and strongly signficant (p = 0.0000), and the mean adjusted R^2 statistic is the highest we have seen so far. This indicates that the variance of the independent variables account for 82.54 percent of the variance of the dependent variable — which is very high explanatory power indeed. Further, this procedure was able to be performed on 849 of the 948 datasets in the study — which is a reduction of only 51 from what was feasible on the ordinary three-state model. The two regional dummies (β_{Q1} and β_{Q2}) are strongly significant, but the two market return coefficients do remain insignificant — on average. Nevertheless, as shown in Table 7-19, either half of the datasets (or nearly half) furnish market return coefficients which are significant at the five percent level.

Table 7-18: Three-state Two Step Model

	Mean	Min	Max	St Dev
F	451.7089	45.2826	49718.5761	2758.5721
Sig. F	0.0000	0.0000	0.0000	0.0000
R^2	0.8311	0.5936	0.9994	0.0705
Adj R^2	0.8254	0.5805	0.9994	0.0728
Variance	0.0000	0.0000	0.0006	0.0000
DW Test	2.0503	1.3843	2.7513	0.2268
β_{Q1}	0.0176	0.0037	0.1129	0.0094
t-Stat	16.0252	3.7095	269.9934	18.2104
p-Value	0.0000	0.0000	0.0003	0.0000
β_{Q2}	-0.017	-0.1092	-0.0041	0.0088
t-Stat	-16.183	-262.1751	-3.9237	19.061
p-Value	0.0000	0.0000	0.0002	0.0000
β_{Q1RMt}	0.2238	-6.0557	4.5814	0.5466
t-Stat	1.9459	-13.1709	43.8459	3.8271
p-Value	0.2014	0.0000	0.9947	0.2770
β_{Q2RMt}	0.1867	-3.466	4.7541	0.4868
t-Stat	1.6398	-12.0102	27.4763	3.6808
p-Value	0.2518	0.0000	0.9985	0.3023
N	849			

However, the percentage of datasets which furnished normal residuals in the procedure's second step has risen close to 70 percent, which is shown in Table 7-19. This is the best mean set of residuals furnished in the study.

Table 7-19: Number of Signifcant Coefficients in the Three-state Two Step Model

Coefficient	$N_{a<0.05}$	%
β_{Q1}	849	100.00%
β_{Q2}	849	100.00%
β_{Q1RMt}	436	51.35%
β_{Q2RMt}	366	43.11%
% Normal Residuals		69.85%

7.5.4 RLS Regressions with Three-state Two Step Model-based Abnormal Returns

I will start with the column of results in Table 7-20 for the full sample in the context of a one-day event window (where ARt_0 is the regressand).

Table 7-20: RLS Regression Results employing ARs from the Three-state Two Step Model

Regressand	CAR3Day			AR_{t0}		
	All Obs.	100 Days	<100 Days	All Obs.	100 Days	<100 Days
Coefficients of Unrestricted Regression (p-Values)						
DD-ED (INTERCEPT)	-0.0153	-0.0155	-0.0163	-0.0072	-0.0051	-0.0088
	(0.0006)	(0.0129)	(0.0034)	(0.0374)	(0.2812)	(0.0408)
ΔEPS	0.0008	-0.0013	0.0010	0.0007	-0.0009	0.0009
	(0.2092)	(0.2496)	(0.1620)	(0.1727)	(0.2779)	(0.1206)
ΔDPS	0.0003	0.0005	0.0003	0.0008	0.0005	0.0008
	(0.2001)	(0.3895)	(0.2806)	(0.0000)	(0.2781)	(0.0002)
DI-EI	0.0248	0.0163	0.0283	0.0139	0.0114	0.0159
	(0.0000)	(0.0550)	(0.0001)	(0.0026)	(0.0763)	(0.0057)
DD-EI	0.0115	-0.0120	0.0208	0.0015	-0.0166	0.0095
	(0.1842)	(0.2997)	(0.0606)	(0.8210)	(0.0600)	(0.2706)
DI-ED	0.0193	0.0213	0.0204	0.0076	0.0017	0.0106
	(0.0086)	(0.0500)	(0.0235)	(0.1820)	(0.8397)	(0.1301)
DNC-EI	0.0164	0.0137	0.0187	0.0085	0.0029	0.0118
	(0.0075)	(0.0913)	(0.0171)	(0.0745)	(0.6386)	(0.0527)
DNC-ED	0.0061	0.0123	0.0049	0.0034	0.0014	0.0048
	(0.2732)	(0.1056)	(0.4816)	(0.4305)	(0.8097)	(0.3768)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)						
N	849	211	638	849	211	638
Adj $R^2_{UNRESTRICTED}$	0.0661	0.0477	0.0800	0.0781	0.0616	0.0907
Adj $R^2_{EQUATION\ (ii)}$	0.0398	0.0062	0.0467	0.0646	0.0065	0.0764
Adj $R^2_{EQUATION\ (iii)}$	0.0615	0.0398	0.0743	0.0532	0.0529	0.0627
$F_{UNRESTRRICTED}$	8.5063	1.4525	7.8309	10.1790	1.9049	8.9790
	(0.0000)	(0.1862)	(0.0000)	(0.0000)	(0.0704)	(0.0000)
$F_{EQUATION\ (ii)}$	17.5410	0.6521	15.5700	29.1900	0.6830	26.2580
	(0.0000)	(0.5220)	(0.0000)	(0.0000)	(0.5062)	(0.0000)
$F_{EQUATION\ (iii)}$	11.0530	1.6999	10.1440	9.4793	2.2904	8.4572
	(0.0000)	(0.1361)	(0.0000)	(0.0000)	(0.0471)	(0.0000)
$F_{FIRST\ ORDER}$	2.0724	0.8386	1.9700	11.3441	0.9384	9.7012
	(0.1265)	(0.4338)	(0.1403)	(0.0000)	(0.3929)	(0.0001)
$F_{INTERACTION}$	4.7344	1.7684	4.5625	2.4681	2.3852	1.9852
	(0.0003)	(0.1208)	(0.0004)	(0.0312)	(0.0395)	(0.0789)

Here, only three individual coefficients in the unrestricted estimation procedure achieve significance. These are the first-order ΔDPS coefficient (albeit tiny in being associated with a 0.08 percent change in AR_{t0} per unit change in itself), and the good-news (DI-EI) and bad-news (DD-ED) interaction effects only. The DI-EI effect was significant at the one percent level of error and its positive coefficient indicates that a unit upward change in this variable is associated with a 1.39 percent upward shift in AR_{t0}. The DD-ED coefficient is negative and smaller in that a unit rise in it is associated with a downward shift of 0.72 percent in AR_{t0}. No other interaction effects are significant; and both the first-order and interaction *F*-statistics are significant (the former, strongly). One could argue that this combination of significant coefficients (in conjunction with those that remain insignificant) furnishes strong proof of an investor reaction to a dividend signal in that the conflicting signals in the mixed news categories have cancelled each other out. This may be correct. However, the fact that we are left only with significant interaction effects in which the dividend change and the earnings change both pull in the same direction means that we cannot distinguish them from each other. The presence of the small but highly significant ΔDPS first-order coefficient may rescue us from that conundrum.

This result is echoed weakly with respect to the relatively thinly-traded subsample in the final column, where the interaction *F*-statistic has lapsed into insignificance excepting at the ten percent level of error (p = 0.0789); and, as ever, the fully-traded subsample furnishes no meaningfully significant results. (This time it furnished a promising interaction *F*-statistic which had nothing to corroborate.)

The results on the three-day window offer a clearer view. They are very similar to the results furnished in Table J-1 (page 316) with respect to friction model unconditional returns in 9Appendix J.5. In particular, the DI-EI and DD-ED interaction effects (for both full sample and thinly-traded subsample) are still strongly significant in the unrestricted regression and are corroborated by strongly significant interaction *F*-statistics. In addition, two mixed-message interaction effects (DI-ED and DNC-EI), have positive and significant coefficients. These results furnish evidence of an investor reaction to a clear dividend signal.

Meanwhile the fully-traded subset yet again failed to furnish any corroborated significant results. Nevertheless, the three-state two step model, which furnished expected returns with the greatest degree of explanatory power of all expected returns in this study, has furnished evidence on a one-day window that investors do react to a dividend signal — which therefore must exist.

7.6 Chapter Conclusions

A number of models relating to the four-state model of Norsworthy, Gorener, Morgan, Schuler and Li (2004) were examined in this chapter. Both the unrotated and rotated versions of the four-state model show huge increases explanatory power over the explanatory power of the basic Market Model. So too did a simple three-state model, which was compiled in this study and then developed as a three-state two step model.

What was much more important than the four-state models in the chapter was that two new five-state models were furnished. These improved upon Norsworthy et al's four-state model by explicitly allowing for an extra state, which was the state of zero-value returns. One of these was an unrotated five-state model and the other was a rotated five-state model. The unrotated five-state model was calculated in two separate ways. In the first instance, it was computed as an OLS regression with a number of dummy variables. In the second instance, it was computed as a friction model. The results for both formulations of the unrotated five-state model were congruent.

It was then found that the rotated five-state model was not an improvement upon the unrotated five-state model. The reason for this was the removal of zero-value returns into a separate ‘state’. Given that the removal of zero-value returns was the salient difference between Norsworthy et al’s two four state models and this study’s two five-state models, it is clear that it was the presence of these zero-value returns that was creating the difference in performance between the North American authors’ unrotated and rotated four-state models. Once these zero-value returns were handled separately, the distinction disappeared.

The chapter went on to investigate a five-state two step model and the three-state and three-state two step models. These last two models had the highest adjusted R^2 statistics of all models looked at in this study. In addition, almost 70 percent of the 849 datasets employed by the three-state two step model furnished distributions of residuals that the Lilliefors Test determined to be nromal with a five percent probability of a Type 1 error. In addition, when CAR3Day and ARt_0 were compiled from ARs derived from the three-state two-step model, the effect on ARt_0 of an unconfounded dividend signal was clearly detected.

8 Conclusions

8.1 Proof of an Investor Reaction to Dividend Signalling?

This thesis set out to examine the record of dividend signalling in the joint dividend-and-earnings announcement context of company disclosures to the New Zealand Stock Exchange (NZX) in the 1990s. Was there any shift in share prices in association with the release of announcement information that could be imputed as evidence of investors acting in accordance with a dividend signal separable from the simultaneously transmitted earnings signal? That was the research question.

Three methodologies were used in checking this research question out. Initially a two-step methodology entailing restricted least squares (RLS) regression on abnormal returns data obtained via the Market Model was employed. This appeared to be a sound technique, having been re-used by researchers in different countries over a span of twelve years without revision. However, it did not address the econometric issue of distortion induced by absences of trading in a thinly-traded market. This shortcoming meant that the expected returns generated by the Market Model would be biased downward in size, and that the abnormal returns calculated from them would be overstated. Hence, a second methodolgy (friction modelling) and a third methodology entailing the employment of state models were investigated as replacements to the simple OLS procedure that is the Market Model. In addition, friction models were also developed to replace the RLS regression procedure in the second step, thereby potentially doing away with the methodology pioneered by Kane, Lee and Marus (1984) entirely.

The answer to the research question about the detection of a dividend signal turned out to be a qualified yes. Some, but not all of the models furnished evidence of it. If a dividend signal could be viewed as an elusive wild beast, then the following models uncovered its spoor:

1. The full five-dummy RLS procedure employed in conjunction with the Market Model in Chapter 5 on data up till May 13th 1996 based on EPS figures calculated in the study (since announcements did not provide them explicitly).

2. All but one of the friction models in Chapter 6 incorporating both event window changes in dividend and changes in earnings. (The exception was the one which entered the two variables additively in the friction model specification, which was methodologically not as sound as the rest of these models — indeed made so by that additivity.)

3. The full five-dummy RLS procedure on measures of abnormal return compiled from the three-state two-step model in Chapter 7.

The following models failed to find it:

1. The full five-dummy RLS procedure in Chapter 5 from May 13^{th} 1996 onward.
2. The full five-dummy RLS procedures in Chapter 7 where the measures of abnormal return were compiled from expected returns generated by the rotated four-state model.
3. The full five-dummy RLS procedures in Chapter 7 where the measures of abnormal return were compiled from expected returns generated by the unrotated five-state model.
4. Wherever the sample was split into a fully-traded subset and a more thinly-traded subset, the fully-traded subsample did not furnish significant results.

Therefore the conclusion indeed must be a qualified ‘yes’. Dividend signalling can be detected in the behaviour of company abnormal returns in the context of the New Zealand market in the 1990s, but only when a number of limiting factors have been taken into account. These limiting factors are the degree of trading that occurs in a share during the estimation period for expected returns, and the exact nature of the model employed. I will now deal with each of these items in turn.

8.2 Market Model with RLS Regression

Because the Market Model and RLS methodology is well understood, and in this study furnished results that were commensurate with prior studies in the US, Australia and the UK in which the effect of thinly-traded markets were not modelled, there is no great need for a finely-detailed debriefing of its nuts and bolts here. While the methodology, as stated in the previous section, did come up with evidence of dividend signalling, two items of interest did spring forth, that are worth considering separately. These were the thin trading effect canvassed immediately below in the next section, and a possible mid-decade shift in investor behaviour, which is discussed in Section 8.6. I will move on to the first of these now.

8.3 Thin Trading

The phenomenon of thin trading was initially ignored in the study in till late in Chapter 5. However, when it was investigated in conjunction with the initial Market Model and RLS methodology, the subsample of companies which had an unbroken record of share trading every day throughout their designated estimation periods showed no evidence of dividend signalling — or at least no evidence of investors acting in response to one. This is similar to the finding more generally in the literature that large companies tend to produce smaller CARS in event studies than those of relatively smaller companies. This tendancy has generally been interpreted as having been a downstream effect of the ongoing supply of information pumped into the market by the analysts who study particular large firms, or by the firms themselves. The steadiness of this supply stands in contrast with a relative absence of information concerning the financial health of smaller listed firms. Hence, when smaller firms make an announcement, the substance of it is less likely to have been predicted from a stream of previous communications.

Perhaps the large firm effect and the absence of thin trading are closely linked phenomena. Large firms with huge market capitalisations are much more likely to have their shares traded every day that the share market is open than would small firms with more modest market capitalisations.

I speculate that the thin-trading effect may be at least a partial explanation as to why smaller companies have traditionally furnished larger CARs in event studies. The effect works in two ways. First, there is the influence of the absence of any steady, ongoing information stream. Second, there is the econometric effect mentioned above that causes expected returns to be understated and ARs and CARs to be exaggerated in size.

However, even when friction models were employed in Chapter 6, the distinction remained. Firms whose shares traded every day furnished no evidence of a dividend signal when RLS regression was employed in the second step.

Nevertheless it should be remembered with respect to the thinly-traded subsample, that it included every degree of thinness of trading from 99 out 100 days downward to less than 10 out of 100. Indeed, the shares of most firms in this subsample traded most of the time. Hence this subsample does not represent extreme thinness.

It was my concern about the econometric difficulties associated with applying the Market Model and RLS methodology to New Zealand's thinly-traded share market that impelled me to investigate friction modelling and state models. The drive to work appropriately with thin market data was a drive to work with it in econometrically sound ways.

8.4 Friction Models

In the face of the OLS (including RLS) regression requirement that the error term be independently and identically distributed (iid), and the fact that company returns data from thin markets does not furnish iid residuals, friction modelling's avoidance of regression's iid error restriction was an attractive attribute. Given the preponderance of zero-value company returns in company returns series calculated on NZX data, a friction model presented itself as an ideal tool for calculating expected returns since it took zero-value company returns explicitly into account. Maximum likelihood estimation (MLE) replaced OLS regression as the computational workhorse in a friction model context, and found, via a quasi-Newton numerical search procedure, the optimal set of parameters to fit the observations from each 100-day estimation period for each company/event.

Two sets of expected returns were calculated from friction model output — unconditional expected returns (reported in Appendix J) and conditional expected returns. The conditional expected returns forecasted into the 21-day test period produced larger ARs than did either the unconditional expected returns or the expected returns of the Market Model. This was a surprising result.

However, the RLS regression results on the full sample obtained when ARt_0 was derived from conditional expected returns furnished both a statistically significant first-order ΔDPS coefficient and ΔEPS coefficient that were corroborated by the related first-order F-statistic; but no noteworthy dividend-and-earnings interaction effects. With respect to CAR3Day derived from conditional expected returns, only the good-news effect (DI-EI) was significant and corroborated. This was some, but not overwhelming evidence of an investor reaction to a dividend signal on the three-day window.

The unconditional returns furnished results that were more closely aligned with those furnished from the original basic Market Model methodology in tandem with the RLS procedure, and furnished evidence of a clear dividend signal in spite of the presence of earnings signal effects.

Then Chapter 6 went on to examine a number of friction models directly modelling the association between ARt_0 and the variables derived from announcement news components. Initially ΔDPS alone was modelled with ARt_0; and then ΔEPS was modelled alone with it. Both furnished significant results, but the coefficient of ΔDPS was much larger. When they were employed simultaneously, they both continued to be significant — and ΔDPS continued to have a bigger beta. But the significance of the ΔDPS was dependent on the fine details of the configuration of the friction model. (With one configuration, where the first-order variables were treated additively, it was insignificant; but with a simpler, more restrictive and more conceptually satisfying configuration it became strongly positive.)

In addition, the coefficients of both variables were found to be much greater (and more significant) on day t_0 than on any other day in the 21-day test period. This does suggest a strong reaction to the advent of both earnings news and dividend news.

I turn now to the friction region where the dependent variable, ARt_0 did not move in association with the first-order news variables. The size of this region was of interest. For the model employing both news variables on the 923 observations of the full sample, this had a value of six percent, which implied that the rise in dividend or in earnings had to be greater than two percent before any impact was observable on the abnormal return variable, and a fall in dividend or in earnings had to be greater in absolute magnitude than four percent. This provided some evidence of the unwillingness of investors to act as fast on bad news as they were prepared to act on good news. This phenomenon is predicted by prospect theory — which covers a large territory that is largely beyond the purview of this study.

The last major area covered by Chapter 6 was the employment of a friction model modelling event window phenomena, incorporating dividend-and-earnings interaction effects. This model was found (by a likelihood ratio test) to be superior to the model employing first-order variables only. Indeed, both dummy variables were strongly significant. This indicated the presence of both earnings signalling and dividend signalling.

Chapter 6 also utilised the study's data in a manner that was different in one further aspect. In order to incorporate dividend initiations and resumptions into the available data set, the two variables, ΔDPS and ΔEPS were reconfigured as simple differences deflated by the previous day's closing price. This turned them into measures of change-in-yield; but it was established that these variables performed in a manner closely aligned to the performance of the percentage change variables used in Chapter 5 (where the formulations were identical with those used by Kane, Lee and Marcus (1984), Easton (1991), Abeyratna (1994) and Lonie, Abeyratna, Power and Sinclair (1996) for the purpose of direct comparison.) The new configuration allowed 948 company/events to be used in the analysis.

8.5 State Asset Pricing Models

State models and friction models handle the problem of thin trading in a similar way. Both can employ zero-trading as a designated 'state'. But where friction models employ MLE, state models fall back upon reliance on the properties of OLS regression. However, these state models do provide a much better fit between company returns and market returns data than either the Market Model or the various friction models.

Chapter 7 enquired into a number of state asset pricing models. The first was the four-state asset pricing model promulgated by Norsworthy, Gorener, Morgan, Schuler and Li (2004) and also used by Jokung and Meyfredi (2003). This model was best understood in terms of partitioning observed company returns by their sign and also by the sign of the accompanying observed market returns in a manner that ostensibly captured the perceptions of investors when they committed themselves to making a trade.

The four-state model came in two versions that were of interest — unrotated and rotated. The unrotated model furnished a view of investor trades in which company returns were measured against the benchmark measure of a zero-value company return under the same market conditions, which was anywhere along the horizontal axis of a quadrant so long as the vertical axis value was zero. The rotated model's shift of the position of the axes changed the classification to one in which company returns were measured, according to Norsworthy et al's application of prospect theory, against investor expectations of company returns based on past share movements under given market conditions.

Norsworthy et al found that their unrotated four-state model had much greater explanatory power than did the Market Model on the same data. The current study found a similar improvement when applying an unrotated four-state model to New Zealand data. This was hardly surprising given that more information about company returns was included in the formulation of expected returns. When rotation was applied, both the American study and the current study recorded further improvements in explanatory power.

Then the current study moved onto new ground. Zero-value returns were explicitly designated as the fifth state and the four-state model became a five-state model, leaving all else unchanged. The unrotated five-state model showed a small increase in explanatory power over the rotated four-state model on the same New Zealand data. However, the rotated five-state model's explanatory power diminished. Effectively, the increase in explanatory power brought about by rotating the four-state model can be ascribed to the handling of zero-value returns. With rotation, they are no longer aligned at zero (with respect to the vertical axis) along the horizontal axis — and this causes them to play a role in determining expected returns that perhaps they should not play.

Chapter 7 then moved on to a five-state two step model. This was essentially the unrotated five-state model with a second tier of estimations added into the procedure to remove the influence of outliers. The explanatory power of this model was reported by a mean adjusted R^2 statistic of 87 percent for the data points in the second regression. This procedure's second tier of estimations involved re-estimating regressions on all observations found to be within an 80 percent confidence interval of the fitted lines from the first tier of regressions. Unfortunately this was very expensive on data sets as every quadrant required the presence of a minimum of six observations — and only 196 of the 948 original data sets met this criterion once the outliers were excluded. This model hints at the efficacy of jump-diffusion modelling.

Chapter 7 then moved on to two three-state models — one of which was also a two step model. The three-state models were of particular interest. They outperformed the Market Model on the same data — and also outperformed both versions of the four-state models in explanatory power and were almost as good as the five-state two step model while not sharing its Achilles heel (data attrition).

The three-state two step model was set up in a manner similar to the five-state two-step model. Its second step entailed re-estimating the three-state OLS regression with data that fell within an 80 percent confidence interval of the fitted lines of the first estimation. The residuals from this second step were normally distributed (according to the Lilliefors test with a five percent error) for almost 70 percent of all data sets employed. And in addition to that, a greater proportion of all estimated coefficients became significant at the five percent level of error than for any other state model estimated. This finding reinforces the study's finding of the pivotal role played by zero-value returns in Market Model output and in the output of 'state' asset pricing models. The three-state two step model was arguably the best model found in Chapter 7.

Next, RLS regressions were estimated on measures of CAR3Day and ARt_0 compiled from the best of the four- and five-state asset pricing models. With respect to measures compiled from the rotated four-state model, no interaction effects were corroborated at all. This furnished strong evidence that there was no investor reaction to any dividend signal. With respect to the unrotated five-state model developed in the current study, there was, again, no corroborated evidence of a dividend signalling effect — although some evidence was discernible if the accepted benchmark for a Type 1 error was expanded to the ten percent level. But the result on ARt_0 most certainly did point to the existence of an investor reaction to an earnings signal.

Finally, a restricted least squares regression was estimated on abnormal returns furnished by the three-state two step asset pricing model. This provided evidence of the existence of a dividend signal.

8.6 A Final Point of Interest

An interesting general finding worth mentioning at this end-point was the discovery, in Chapter 5, of a fall-off in association between the dividend-and-earnings news events and the behaviour of ARs and CARs in the second half of the decade.

There were a number of possible reasons for this. The first was that the failure to find a significant association following the change in NZX disclosure regulations that took effect in

May 1996[178] might have indicated that investors actually might not have used the figures as disclosed, but, instead, used some other measure of company profitability.

The second was that investors, in the latter half of the decade, could have become less concerned about dividend streams as a component of their share-holding strategies, and more concerned about capital gains. There was certainly some comment, internationally that the importance of dividends might have been waning. The Economist November 18th 1999, for instance ran an article titled "Shares without the other bit" with the opening line, "In Corporate America paying dividends has gone out of fashion."

The third possibility was that investors no longer reacted to the final top-up dividend that had ceased to be reported, but were reacting to news of change in the cumulated total dividend for the year in end-of year announcements. This is an interesting avenue for future exploration.

This possible change of investor behaviour was explored only in terms of the Market Model and RLS methodology of Chapter 5. This is one of the limitations of this study — as it would have been interesting to see if the other methodologies confirmed the phenomenon.

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[178] These changes included two vital matters with respect to this study. First, EPS figures were required as of May 1996 and not before. Second, the dividend figure required as of May 1996 was the cumulative dividend for the year and not the final dividend which had been required beforehand.

9 Bibliography

ABEYRATNA, G., (1994): *An Empirical Investigation of UK Stock Market Reaction to Dividend Announcements in a Complex Signalling Environment.* PhD Dissertation, University of Dundee.

ABEYRATNA, G., A. A. LONIE, D. M. POWER, AND C. D. SINCLAIR, (1996): "The Influence of Company Financial Performance on the Interpretation of Dividend and Earnings Signals: A Study of Accounting- and Market-based Data," *British Accounting Review* 28: 229-247.

AGRAWAL, A., AND J. NARAYANAN, (1994): "The Dividend Policies of All-Equity Firms: A Direct Test of the Free Cash Flow Theory," *Managerial and Decision Economics* 15: 139-48.

AHARONY, J., AND I. SWARY, (1980): "Quarterly Dividend and Earnings Announcements and Stockholders' Returns: An Empirical Analysis," *Journal of Finance* 35: 1-12.

AHARONY, J., H. FALK, AND I. SWARY, (1988): "Information Content of Dividend Increases: The Case of Regulated Utilities," *Journal of Business Finance and Accounting* 15: 401-14.

AKHIGBE, A., AND J. MADURA, (1996): "Dividend Policy and Corporate Performance," *Journal of Business Finance and Accounting* 23, no. 9 & 10, December: 1267-1287.

ALEXANDER, P. B., AND C. BLANCHARD, (1992): *Dividend Policy: A New Zealand and American Comparison*. Working Paper 1/92, Department of Accountancy, University of Canterbury, Christchurch, New Zealand.

ALLEN, D. E., AND V. S. RACHIM, (1996): "Dividend Policy and Stock Price Volatility: Australian Evidence," *Applied Financial Economics* 6, no. 2, April: 175-188.

ALLI, K. L., A. Q. KHAN, AND G. G. RAMIREZ, (1993): "Determinants of Corporate Dividend Policy: A Factorial Analysis," *Financial Review* 28, no. 4, November: 523-47.

ALMEKINDERS, G. J., AND S. C. W. EIJFFINGER, (1996): "A Friction Model of Daily Bundesbank and Federal Reserve Intervention," *Journal of Banking and Finance* 20: 1365-1380.

AMBARISH, R., J. KOSE, AND J. WILLIAMS, (1987): "Efficient Signalling with Dividends and Investments," *Journal of Finance* 42, no. 2, June: 321-343.

AMIHUD, Y., AND M. MURGIA, (1997): "Dividends, Taxes and Signaling: Evidence from Germany," *Journal of Finance* 52, no. 1, March: 357-407.

ASQUITH, P., AND D. W. JR. MULLINS, (1983): "The Impact of Initiating Dividend Payments on Shareholders' Wealth," *Journal of Business* 56, no. 1, January: 77-96.

ASQUITH, P., AND W. S. KRASKER, (1985): *Changes in Dividend Policy, and Stock Trading Volume*. Working paper, October. (Harvard Business School, Cambridge MA).

ATIASE, R. K., (1985): "Predisclosure Information, Firm Capitalization, and Security Price Behavior Around Earnings Announcements," *Journal of Accounting Research* 23, no. 1, Spring: 21-35.

BAE, G. S., (1996): "Post-Announcement Drifts Associated with Dividend Changes," *The Journal of Financial Research* 19, no. 4, Winter: 541-559.

BAJAJ, M., AND A. M. VIJH, (1990): "Dividend Clienteles and the Information Content of Dividend Changes," *Journal of Financial Economics* 26: 193-219.

BAJAJ, M., AND A. M. VIJH, (1995): "Trading Behavior and the Unbiasedness of the Market Reaction to Dividend Announcements," *Journal of Finance* 50, no. 1, March: 255-279.

BALL, R., (1999): "The Theory of Stock Market Efficiency: Accomplishments and Limitations," Chapter in *The New Corporate Finance*, Second Edition, D. H. Chew (Editor), Irwin McGraw-Hill, Boston.

BALL, R., AND P. BROWN, (1968): "An Empirical Evaluation of Accounting Income Numbers," *Journal of Accounting Research* 6, Autumn: 159-178.

BARTHOLDY, J. AND A. RIDING, (1994): "Thin Trading and the Estimation of Betas: The Efficacy of Alternative Techniques," *The Journal of Financial Research* 27, no. 2, Summer: 241-254.

BEAVER, W. H., (1968): "The Information Content of Annual Earnings Announcements," *Journal of Accounting Research* 6, Empirical Research in Accounting: Selected Studies: 67-92.

BENARTZI, S., R. MICHAELY, AND R. THALER, (1997): "Do changes in Dividends Signal the Future of the Past?" *Journal of Finance* 52, no. 3, July: 1007-1034.

BENEISH, M. D., AND R. E. WHALEY, (1996): "An Anatomy of the "S & P Game": The Effect of Changing the Rules," *Journal of Finance* 51: 1909-1930.

BENESH, G. A., A. J. KEOWN, AND J. M. PINKERTON, (1984): "An Examination of Market Reaction to Substantial Shifts in Dividend Policy," *Journal of Financial Research* 7: 131-42.

BERGLUND, T., E. LILJEBLOM AND A. LOFLUND, (1989): "Estimating Betas on Daily Data for a Small Stock Market," *Journal of Banking and Finance* 13: 41-64.

BERNHEIM, B. D, (1991): "Tax Policy and the Dividend Puzzle," *Rand Journal of Economics* 22, no. 4, Winter: 455-476.

BERNHEIM, B. D., AND A. WANTZ, (1995): "A Tax-Based Test of the Dividend Signaling Hypothesis," *American Economic Review* 85, no. 3, June: 532-551.

BEST, R. J., AND R. W. BEST, (2000): "Earnings Expectations and the Relative Information Content of Dividend and Earnings Announcements," *Journal of Economics and Finance* 24, no 3, Fall: 232-245.

BHATTACHARYA, S., (1979): "Imperfect Information, Dividend Policy, and 'The Bird in the Hand' Fallacy," *Bell Journal of Economics* 10, no. 1, Spring: 259-70.

BHATTACHARYA, S., (1980): "Nondissipative Signaling Structures and Dividend Policy," *The Quarterly Journal of Economics* 95, no. 1, August: 1-24.

BLACK, F., (1976): "The Dividend Puzzle," *Journal of Portfolio Management* , no. Winter: 215-20.

BLACK, F., AND M. S. SCHOLES, (1974): "The Effects of Dividend Yield and Dividend Policy on Common Stock Prices and Returns," *Journal of Financial Economics* 1, no. 1, May: 1-22.

BLUME, M. E., (1980): "Stock Returns and Dividend Yields: Some More Evidence," *Review of Economics and Statistics* 62, no. 4: 567-577.

BOEHME, R. D., AND S. M. SORESCU, (2002): "The Long-Run Performance Following Dividend Initiations and Resumptions: Underreaction or Product of Chance?" *Journal of Finance* 57, no. 2, April: 871-900.

BOEHMER, E., J. MUSUMECCI, AND A. POULSEN, (1991): "Event Study Methodology under Conditions of Event induced Variance," *Journal of Financial Economics* 30: 253-272.

BOOTH, G. G., J. P. KALLUNKI, AND T. MARTIKAINEN, (1996): "Postannouncement Drift and Income Smoothing: Finnish Evidence," *Journal of Business Finance and Accounting* 23: 1197-1211.

BORN, J. A., AND J. N. RIMBEY, (1993): "A Test of the Easterbrook Hypothesis Regarding Dividend Payments and Agency Costs," *The Journal of Financial Research* 16, no. 3, Fall: 251-260.

BORN, J. A., (1988): "Insider Ownership and Signals: Evidence from Dividend Initiation Announcement Effects," *Financial Management* 17, no. 1, Spring: 38-45.

BOWERS, H. M, AND D. FEHRS, (1995): "Dividend Buying: Linking Dividend Announcements and Ex-Dividend Day Effects," *Journal of Accounting, Auditing and Finance* 10, no, 3, Summer (New Series): 421-435.

BRADBURY, M. E., (1991): "Characteristics of Firms and Voluntary Interim Earnings Disclosures: New Zealand Evidence," Pacific Accounting Review 3, no. 1,: 37-62.

BRENNAN, M. J., (1970): "Taxes, Market Valuation and Corporate Financial Policy," *National Tax Journal* 23, no. 4: 417-427.

BRENNAN, M. J., (1971): "A Note on Dividend Irrelevance and the Gordon Valuation Model," *Journal of Finance* 26, no. 5, December: 1115-21.

BRICKLEY, J. A., (1983): "Shareholder Wealth, Information Signaling and the Specially Designated dividend," *Journal of Financial Economics* 12: 187-209.

BROOK, Y., W. T. CHARLTON JR,. AND R. J. HENDERSCHOTT, (1998): "Do firms Use Dividends to Signal Large Future Cash Flow Increases?" *Financial Management* 27, no. 3, Autumn: 46-57.

BROOKS, R. M., (1996): "Changes in Asymmetric Information at Earnings and Dividend Announcements," *Journal of Business Finance and Accounting* 23, no. 3, April: 359-378.

BROWN, L. D., D. P. CHOI, AND K. KIM, (1991): *The Information Content of Dividends: A Test of Signal Mitigation*. Working paper. (SUNY Buffalo).

BROWN, L. D., D. P. CHOI, AND K. KIM, (1994): "The Impact of Announcement Timing on the Informativeness of Earnings and Dividends," *Journal of Accounting, Auditing and Finance* 9, no. 4, Fall: 653-674.

BROWN, S. J. AND J. B. WARNER, (1980): "Measuring Security Price Performance," *Journal of Financial Economics* 8: 205-258.

BROWN, S. J. AND J. B. WARNER, (1985): "Using Daily Stock Returns: The Case of Event Studies," *Journal of Financial Economics* 14: 3-31.

CAMPBELL, C. J., AND C. E. WASLEY, (1993): "Measuring Security Price Performance using Daily NASDAQ Returns," *Journal of Financial Economics* 33: 73-92.

CAMPBELL, J. Y., A. W. LO, AND A. C. MACKINLAY, (1997): *The Econometrics of Financial Markets*, Princeton University Press, Princeton, New Jersey.

CARROLL, T. J., (1995): "The Information content of Quarterly Dividend Changes," *Journal of Accounting, Auditing and Finance* 10, no. 2 (New Series) Spring: 293-317.

CHAREST, G., (1978): "Dividend Information, Stock Returns and Market Efficiency - II," *Journal of Economics and Business* 6: 297-330.

CHOWDHURY, G., AND D. K. MILES, (1987): *An Empirical Model of Companies' Debt and Dividend Decisions: Evidence form Company Accounts Data*, Bank of England Discussion Paper No. 28.

CHRISTIE, W. G., (1994): "Are Dividend Omissions Truly the Cruelest Cut of All?" *Journal of Financial and Quantitative Analysis* 29, no. 3, September: 459-80.

CLARE, A. D., P. N. SMITH, AND S. H. THOMAS, (1997): "UK Stock Returns and Robust Tests of Mean Variance Efficiency," *Journal of Banking and Finance* 21: 641-660.

COCHRANE, J., (1999): *New Facts in Finance*, Working Paper, National Bureau of Economic Research, Cambridge, Massachusetts.

COHEN, K. J., G. A HAWAWINI, S. F. MAIER, R. A SCHWARTZ, AND D. K. WHITCOMB, (1983a): "Estimating and Adjusting for the Intervalling-Effect Bias in Beta," *Management Science* 29, no. 1, January: 135-148.

COHEN, K. J., G. A HAWAWINI, S. F. MAIER, R. A SCHWARTZ, AND D. K. WHITCOMB, (1983b): "Friction in the Trading Process and the Estimation of Systematic Risk," *Journal of Financial Economics* 12, no. 2, August: 263-278.

CONRAD, J., G. KAUL, AND M. NIMALENDRAN, (1991): "Components of Short-horizon Individual Security Returns," *Journal of Financial Economics* 29: 365-384.

CONROY, R., K. M. EADES, AND R. S. HARRIS, (2000): "A test of the Relative Pricing Effects of Dividends and Earnings: Evidence from Simultaneous Announcements in Japan," *The Journal of Finance* 55, no. 3, June: 1199-1227.

CORRADO, C. J., (1989): "A Nonparametric Test for Abnormal Security-Price Performance in Event Studies," *Journal of Financial Economics* 23, no. 2, August: 385-395.

CORRADO, C. J., AND T. L. ZIVNEY, (1992): "The Specification and Power of the Sign Test in Event Study Hypothesis Tests using Daily Stock Returns," *Journal of Financial and Quantitative Analysis* 27: 465-478.

COWAN, A. R., (1992): "Nonparametric Event Study Tests," *Review of Quantitative Finance and Accounting* 2: 343-358.

COWAN, A. R., AND A. M. A. SERGEANT, (1996): "Trading Frequency and Event Study Test Specification," *Journal of Banking and Finance* 20: 1731-1757.

CRAGG, J. C., (1986): "The Relationship of Dividend Payments to the Characteristics of the Earnings Streams of Corporations," Chapter 10, in *Prices, Competition and Equilibrium* by M. H. Preston and R. E. Quandt. Phillip Allen, London.

DAGENAIS, M. G., (1969): "A Threshold Regression Model," *Econometrica*, 37: 193-203.

DAGENAIS, M. G., (1975): "Application of a Threshold Regression Model to Household Purchases of Automobiles," *Review of Economics and Statistics* 57: 275-285.

DANIEL, K., D. HERSHLEIFER, AND A. SUBRAHMANYAM, (1998): "Investor Psychology and Security Market Under- and Over-reaction," *Journal of Finance* 53: 1839-1885.

DARLING, P. G., (1957): "The Influence of Expectations and Liquidity on Dividend Policy," *Journal of Political Economy* 65, no. 3, June: 209-24.

DARROUGH, M., AND N. STOUGHTON, (1990): "Financial Disclosure Policy in an Entry Game," *Journal of Accounting and Economics* 12, January: 219-243.

DEANGELO, H., L. DEANGELO, AND D. J. SKINNER, (1992): "Dividends and Losses," *Journal of Finance* 47, no. 5, December: 1837-1863.

DEANGELO, H., L. DEANGELO, AND D. J. SKINNER, (1996): "Reversal of Fortune: Dividend Signaling and the Disappearance of Sustained Earnings Growth," *Journal of Financial Economics* 40, no. 3, March: 341-371.

DEANGELO, H., L. DEANGELO, AND D. J. SKINNER, (2000): "Special Dividends and the Evolution of Dividend Signaling," *Journal of Financial Economics* 57, no. 3, September: 309-354.

DENIS, D. J., D. K. DENIS, AND A. SARIN, (1994): "The Information Content of Dividend Changes: Cash Flow Signaling, Overinvestment, and Dividend Clienteles," *Journal of Financial and Quantitative Analysis* 29, no. 4, December: 567-587.

DESARBO, W. S., V. R. RAO, J. H. STECKEL, J. WIND, AND R. COLOMBO, (1987): "A Friction Model for Describing and Forecasting Price Changes," *Marketing Science* 6: 299-319.

DIELMAN, T. E., AND H. R. OPPENHEIMER, (1984): "An Examination of Investor Behaviour During Periods of Large Dividend Changes," *Journal of Financial and Quantitative Analysis* 19: 197-216.

DILLEN, H., AND B. STOLTZ, (1999): "The Distribution of Stock Market Returns and the Market Model," *Finnish Economic Papers* 12: 41-56.

DIMSON, E., (1979): "Risk Management when Shares are Subject to Infrequent Trading," *Journal of Financial Economics* 7, no. 2, June: 197-226.

DIMSON, E., AND P. R. MARSH, (1983): "The Stability of UK Risk Measures and the Problem of Thin Trading," *Journal of Finance* 38, no. 3, June: 753-783.

DIVECHA, A., AND D. MORSE, (1983): "Market Responses to dividend Increases and Changes in Payout Ratios," *Journal of Financial and Quantitative Analysis* 18: 163-73.

DOCKING, D. S., AND P. D. KOCH, (1999): *The Sensitivity of Event Study Results to Market Direction and Volatility: The Case of Dividend Change Announcements*. Working paper, December. (School of Business, University of Kansas).

DYL, E. A., AND R. A. WEIGAND, (1998): “The Information Content of Dividend Initiations: Additional Evidence,” *Financial Management* 27, no. 3, Autumn: 27-35.

EADES, K. M., P. J. HESS, AND E. HAN KIM, (1984): “On Interpreting Security Returns During the Ex-Dividend Period,” *Journal of Financial Economics* 13: 3-35.

EADES, K. M., P. J. HESS, AND E. HAN KIM, (1985): “Market Rationality and Dividend Announcements,” *Journal of Financial Economics* 14, no. 4, December: 581-604.

EASTERBROOK, F. H., (1984): “Two Agency-Cost Explanations of Dividends,” *American Economic Review* 74, no. 4: 650-659.

EASTON, S. A., AND N. A. SINCLAIR, (1989): “The Impact of Unexpected Earnings and Dividends on Abnormal Returns to Equity,” *Accounting and Finance* 29, no. 1, May: 1-19.

EASTON, S., (1991): “Earnings and Dividends: Is there an Interaction Effect?” *Journal of Business Finance and Accounting* 18, no. 2, January: 255-66.

EDDY, A., AND B. SEIFERT, (1988): “Firm Size and Dividend Announcements,” *The Journal of Financial Research* 11, no. 4, Winter: 295-302.

EDDY, A., AND B. SEIFERT, (1992): “Stock Price Reactions to Dividend and Earnings Announcements: Contemporaneous versus Noncontemporaneous Announcements,” *Journal of Financial Research* 15: 207-217.

ELFAKHANI, S., (1998): “The Expected Favorableness of Dividend Signals, the Direction of Dividend Change and the Signaling Role of Dividend Announcements. Applied Financial Economics 8, no. 3, June: 221-230.

ELIASON, S. R., (1993): *Maximum Likelihood Estimation: Logic and Practice*, Quantitative Applications in the Social Sciences 96, Sage Publications, London.

EMANUEL, D. M., (1984): “The Information Content of Sign and Size of Earnings Announcements: New Zealand Evidence,” *Accounting and Finance* 24, No. 2, November: 25-43.

FAMA, E. F., (1965): “The Behavior of Stock-Market Prices,” *Journal of Business* 38, January: 34-105.

FAMA, E. F., (1970): “Efficient Capital Markets: A Review of Theory and Empirical Work,” *Journal of Finance* 25, No. 2, May: 383-417.

FAMA, E. F., AND H. BABIAK, (1968): “Dividend Policy: An Empirical Analysis,” *Journal of the American Statistical Association* 63, December: 1132-1161.

FAMA, E. F., AND K. R. FRENCH, (1993): “Common Risk Factors in Returns on Stocks and Bonds,” *Journal of Financial Economics*, 33: 3-56.

FAMA, E. F., AND K. R. FRENCH, (2001): “Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay?” *Journal of Financial Economics*, 60, no. 1, April: 3-43.

FAMA, E. F., L. FISHER, M. C. JENSEN, AND R. ROLL, (1969): “The Adjustment of Stock Prices to New Information,” *International Economic Review* 10, No. 1, February: 1-21.

FEHRS, D. H., G. A. BENESH, AND D. R. PETERSON, (1988): "Evidence of a Relation between Stock Price Reactions around Cash Dividend Changes and Yields," *The Journal of Financial Research* 11,no. 2, Summer: 111-123.

FINNERTY, J., (1981): "The Behavior of Elective Utility Common Stock Prices near the Ex-Dividend Date," *Financial Management* 10: 59-69.

FIRTH, M., (1996): "Dividend Changes, Abnormal Returns, and Intra-Industry Firm Valuations," *Journal of Financial and Quantitative Analysis* 31, no. 2, June: 189-211.

FISHER, L. (1966): "Some New Stock Market Indices," *Journal of Business* 39: 191-225.

FORBES, S. M., AND L. S. MAYNE, (1989): "A Friction Model of the Prime," *Journal of Banking and Finance*: 13, 127-135.

FOWLER, D. J. AND C. H. RORKE, (1983): "Risk Measurement when Shares are Subject to Infrequent Trading: Comment," *Journal of Financial Economics* 12, no. 2, August: 279-283.

FOWLER, D. J., C. H. RORKE, AND V. M. JOG, (1979): "Heteroscedasticity, R^2 and Thin Trading on the Toronto Stock Exchange," *Journal of Finance* 33, no. 5, December: 1201-1210.

FOWLER, D. J., C. H. RORKE, AND V. M. JOG, (1989): "A Bias-correcting Procedure for Beta Estimation in the Presence of Thin Trading," *The Journal of Financial Research* 12, no.1, Spring: 23-32.

FOX , N., AND P. GREEN, (1992): *Intertemporal Dividend Models and the Information Content of Dividends: UK Evidence*, British Accounting Association Annual Research Conference.

GALPIN, N., (2004): *Can the Pecking Order Explain the Costs of Raising Capital?* Indiana University, Kelley School of Business Working Paper: 1-46.

GELB, D. S., (2000): "Corporate Signaling with Dividends, Stock Repurchases, and Accounting Disclosures: An Empirical Study," *Journal of Accounting, Auditing and Finance* 15, no. 2 (New Series), Spring: 99-120.

GHOSH, C., (1993): "A Regret-Theoretic Explanation of Corporate Dividend Policy," *Journal of Business Finance and Accounting* 20, no. 4, June: 559-573.

GHOSH, C., AND J. R. WOOLRIDGE, (1988): "An Analysis of Shareholder Reaction to Dividend Cuts and Omissions," *The Journal of Financial Research* 11, no. 4, Winter: 281-294.

GHOSH, C., AND J. R. WOOLRIDGE, (1991): "Dividend Omissions and Stock Market Rationality," *Journal of Business Finance and Accounting* 18, no. 3, April: 315-330.

GONEDES, N. J., (1978): "Corporate Signaling, External Accounting, and Capital Market Equilibrium: Evidence on Dividends, Income and Extraordinary Items," *Journal of Accounting Research* 16, no. 1, Spring: 26-79.

GORDON, M. J., (1962): "The Savings Investment and Valuation of a Corporation," *Review of Economics and Statistics* 44, no. 1, February: 37-51.

GRANT, D., (1997): *Bulls, Bears and Elephants: A History of the New Zealand Stock Exchange*, Victoria University Press, Wellington, New Zealand.

Greene, W. H., (2003): *Econometric Analysis*, Fifth Edition, Prentice Hall, New Jersey.

GUJARATI, D. N., (1995): *Basic Econometrics*, Third Edition, McGraw-Hill International, McGraw-Hill Inc, New York.

GUNASEKARAGE, A. AND D. M. POWER, (2002): "The Post-announcement Performance of Dividend-changing Companies: The Dividend-signalling Hypothesis Revisited," *Accounting and Finance* 42: 131-151.

HAKANSSON, N. H., (1982): "To Pay or Not to Pay Dividend," *The Journal of Finance* 37, no. 2, May: 415-428.

HAMSON, D., AND P. ZIEGLER, (1990): "The Impact of Dividend Imputation on Firms' Financial Decisions," *Accounting and Finance* 30, no. 2, November: 29-55.

HASBROUCK, J., (1991): "Measuring the Information Content of Stock Trades," *Journal of Finance* 46, no. 1, March: 179-207.

HASHIMOTO, Y., AND I. TAKATOSHI, (2004): *High-Frequency Contagion between the Exchange Rates and Stock Prices*, NBER Working Paper Series Working Paper 10448.

HAW, I., AND W. KIM, (1991): "Firm Size and Dividend Announcement Effect," *Journal of Accounting, Auditing and Finance* 6, no. 3 (New Series), Summer: 325-347.

HEALY, P. M., AND K. G. PALEPU, (1988): "Earnings Information Conveyed by Dividend Initiations and Omissions," *Journal of Financial Economics* 21: 149-75.

HO, S., AND C. WU, (2001): "The Earnings Information Content of Dividend Initiations and Omissions," *Journal of Business Finance and Accounting* 28, nos 7 & 8: 963-977.

HOWE, J. S., AND J. LIN, (1992): "Dividend Policy and the Bid-Ask Spread: An Empirical Analysis," *Journal of Financial Research* 15, no. 1, Spring: 1-10.

HOWE, J. S., AND Y. SHEN, (1998): "Information Associated with Dividend Initiations: Firm-Specific or Industry-Wide?" *Financial Management* 27, no. 3, Autumn: 17-26.

IMPSON, M., (1997): "Market Reaction to Dividend-decrease Announcements: Public Utilities vs. Unregulated Industrial Firms," *The Journal of Financial Research* 20, no. 3, Fall: 407-422.

IMPSON, M., (2000): "Contagion Effects of Dividend Reduction or Omission Announcements in the Electric Utility Industry," *The Financial Review* 41: 121-136.

JAIN, P. C., (1986): "Analyses of the Distribution of Security Market Model Prediction Errors for Daily Return Data," *Journal of Accounting Research* 24, no. 1, Spring: 76-96.

JENSEN, G. R., D. P. SOLBERG, AND T. S. ZORN, (1992): "Simultaneous Determination of Insider Ownership, Debt and Dividend Policies," *Journal of Financial and Quantitative Analysis* 27, no. 2, June: 247-263.

JENSEN, M. C., (1986): "Agency Costs of Free Cash Flow, Corporate Finance, and Takeover," *American Economic Review* 76, no. 2, May: 323-329.

JOHN, K., AND J. WILLIAMS, (1985): "Dividends, Dilution, and Taxes: A Signaling Equilibrium", *Journal of Finance* 40, no. 4, September: 1053-1070.

JOHN, K., AND L. H. P. LANG, (1991): "Insider Trading around Dividend Announcements: Theory and Evidence," *Journal of Finance* 46: 1361-1389.

JOKUNG, O. AND J-C. MEYFREDI, (2003): *Improving the Market Model: The 4-State Model Alternative*, Working Paper, EDHEC Risk and Asset Management Research Center, Lille Cedex, France: 1-24.

KAESTNER, R., AND F. LIU, (1998): "New Evidence on the Information Content of Dividend Announcements," *The Quarterly Review of Economics and Finance* 38, no. 2: 251-274.

KAHNEMAN, D., AND A. TVERSKY, (1979): "Prospect Theory: An Analysis of Decision Under Risk," *Econometrica* 47 no. 2: 263-291.

KALAY, A., (1980): "Signaling, Information Content, and the Reluctance to Cut Dividends," *Journal of Financial and Quantitative Analysis*. 15, no. 4 (Proceedings Issue), November: 855-865.

KALAY, A., (1982): "The Ex-Dividend Day Behavior of Stock Prices: A Re-Examination of the Clientele Effect," *Journal of Finance* 37, no. 4, September: 1059-1070.

KALAY, A., AND U. LOEWENSTEIN, (1985): "Predictable Events and Excess Returns: The Case of Dividend Announcements," *Journal of Financial Economics* 14: 423-449.

KALAY, A., AND U. LOEWENSTEIN, (1986): "The Informational Content of the Timing of Dividend Announcements. 16, no. 3, July: 373-88.

KALLUNKI, J., (1997): "Handling Missing Prices in a Thinly Traded Stock Market: Implications for the Specification of Event Study Methods," *European Journal of Operational Research* 103: 186-197.

KANE, A., Y. K. LEE, AND A. MARCUS, (1984): "Earnings and Dividend Announcements: Is there a Corroboration Effect?" *Journal of Finance* 39, no. 4, September: 1091-99.

KAO, C., AND C. WU, (1994): "Tests of Dividend Signaling Using the Marsh-Merton Model: A Generalised Friction Approach," *Journal of Business*, 67: 45-68.

KOMUNJER, I., (2004): *Asymmetric Power Distribution: Theory and Applications to Risk Measurement*, Working Paper, Caltech, Pasadena, California.

LAKONISHOK, J. AND T. VERMAELEN, (1986): "Tax-Induced Trading Around Ex-Dividend Days," *Journal of Financial Economics* 16: 287-319.

LALLY, M., (1992): "The CAPM under Dividend Imputation," *Pacific Accounting Review* 4, no. 1, December: 31-44.

LANG, L. H. P., AND R. H. LITZENBERGER, (1989): "Dividend Announcements: Cash Flow Signaling vs Free Cash Flow Hypothesis?" *Journal of Financial Economics* 24: 181-191.

LAZLO, S. A., (1999): "Speaking of Dividends," *Barron's Magazine*. January 4: 40.

LEFTWICH, R., AND M. E. ZMIJEWSKI, (1994): "Contemporaneous Announcements of Dividends and Earnings," *Journal of Accounting, Auditing and Finance* 9, no. 4, Fall: 725-762.

LESMOND, D. A., (1995): *Transaction Costs and Security Return Behavior: The Effect on Systematic Risk and Firm Size*, Unpublished Dissertation, State University of New York at Buffalo.

LESMOND, D. A., J. P. OGDEN, AND C. A. TRZCINKA, (1999): "A New Estimate of Transactions Costs," *Review of Financial Studies*, 12, no 5: 1113-1141.

LINTNER, J., (1956): "Distribution of Incomes of Corporations among Dividends, Retained Earnings, and Taxes," *American Economic Review* 46, no. 2, May: 97-113.

LINTNER, J., (1965): "The Valuation of Risky Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," *Review of Economics and Statistics* 47: 13-37.

LIPPERT, R. L., T. D. NIXON, AND E. A. PILOTTE, (2000): "Incentive Compensation and the Stock Price Response to Dividend Increase Announcements," *The Financial Review* 35: 69-94.

LIPSON, M. L., C. P. MAQUIEIRA, AND W. MEGGINSON, (1998): "Dividend Initiations and Earnings Surprises," *Financial Management* 27, no. 3, Autumn: 36-45.

LITZENBERGER, R. H., AND K. RAMASWAMY, (1979): "The Effect of Personal Taxes and Dividends on Capital Asset Prices", *Journal of Financial Economics* 7: 163-195.

LITZENBERGER, R. H., AND K. RAMASWAMY, (1980): "Dividends, Short Selling Restrictions, Tax-Induced Investor Clienteles and Market Equilibrium," *Journal of Finance* 35, no 2, May: 469-482.

LITZENBERGER, R. H., AND K. RAMASWAMY, (1982): "The Effects of Dividends on Common Stock Prices: Tax Effects or Information Effects?" *Journal of Finance* 37, no. 2, May: 429-43.

LONG, J. B. JR., (1978): "The Market Valuation of Cash Dividends: A Case to Consider," *Journal of Financial Economics* 6: 235-64.

LONG, J. S., (1997): *Regression Models for Categorical and Limited Dependent Variables*, Advanced Quantitative Techniques in the Social Sciences Series 7, Sage Publications Inc, California.

LONIE, A. A., G. ABEYRATNA, D. M. POWER, AND SINCLAIR C. D, (1996): "The Stock Market Reaction to Dividend Announcements," *Journal of Economic Studies* 23, no. 1: 32-52.

MADDALA, G. S., (1983): *Limited Dependent and Qualitative Variables in Econometrics*, Econometric Society Monographs No. 3, Cambridge University Press, Cambridge, Massachusetts.

MAK, Y. T., (1990): *An Examination of Profit Forecast Disclosure in New Zealand Prospectuses*. Securities Commission, Wellington, New Zealand.

MANDELBROT, B., (1963): "The Variation of Certain Speculative Prices," *Journal of Business* 36: 394-419.

MANDELBROT, B., (1966): "Forecasts of Future Prices, Unbiased Markets, and Martingale Models," *Journal of Business* 39, Special Supplement, January: 242-255.

MARSH, P., (1979): "Equity Rights Issues and the Efficiency of the UK Stock Market," *Journal of Finance* 34, no. 4, September: 839-862.

MARSH, P., (1993): *Dividend Announcements and Stock Price Performance*. Paper presented at the Financial Markets Group Conference on Dividends and Earnings Forecasting and Valuation, London School of Economics, March 23.

MARSH, T. A., AND R. C. MERTON, (1987): "Dividend Behavior for the Aggregate Stock Market," *Journal of Business* 60: 1-40.

MARTIKAINEN, T., J. PERTTUNEN, P. YLI-OLLI, AND A. GUNASKARAN, (1994): "The Impact of the Return Interval on Common Factors in Stock Returns: Evidence from a Thin Market," *Journal of Banking and Finance* 18: 659-672.

MCINISH, T. H., AND R. A. WOOD, (1985): "A new Approach to Controlling for Thin Trading," *The Journal of Financial Research* 8, no. 1, Spring: 69-75.

MICHAELY, R., R. H. THALER, AND K. L. WOMACK, (1995): "Price Reactions to Dividend Initiations and Omissions: Overreaction or Drift?" *Journal of Finance* 50, no. 2, June: 573-608.

MILLER, M. H., AND F. MODIGLIANI, (1961): "Dividend Policy, Growth and the Valuation of Shares," *Journal of Business* 34, no. 4, October: 411-33.

MILLER, M. H., AND K. ROCK, (1985): "Dividend Policy under Asymmetric Information," *Journal of Finance* 40, no. 4, September: 411-33.

MORIN, R., (1976): *Capital Asset Pricing Theory: The Canadian Experience*, Ph.D. Thesis, The University of Pennsylvania.

MOZES, H., AND D. RAPACCIOLI, (1995): "The Relation Among Dividend Policy, Firm Size, and the Information Content of Earnings Announcements," *The Journal of Financial Research* 28, no. 1, Spring: 75-88.

MOZES, H., AND D. RAPACCIOLI, (1998): "The Link Between Dividend Changes and Future Earnings," *Journal of Financial Statement* Analysis 3, no. 3, Spring: 29-39.

New Zealand Stock Exchange Share Market Review for the year ending 31 December 1989, New Zealand Stock Exchange, Wellington, New Zealand.

New Zealand Stock Exchange Share Market Review for the year ending 31 December 1990, New Zealand Stock Exchange, Wellington, New Zealand.

New Zealand Stock Exchange Share Market Review for the year ending 31 December 1991, New Zealand Stock Exchange, Wellington, New Zealand.

New Zealand Stock Exchange Share Market Review for the year ending 31 December 1992, New Zealand Stock Exchange, Wellington, New Zealand.

New Zealand Stock Exchange Share Market Review for the year ending 31 December 1993, New Zealand Stock Exchange, Wellington, New Zealand.

New Zealand Stock Exchange Share Market Review for the year ending 31 December 1994, New Zealand Stock Exchange, Wellington, New Zealand.

NISSIM, D., AND A. ZIV, (2001): "Dividend Changes and Future Profitability," *Journal of Finance* 56, no. 6, December: 2111-2133.

NORSWORTHY, J. R., R. GORENER, I. W. MORGAN, R. E. SCHULER JR, AND D. LI, (2004): *Expected Utility, Prospect Theory and Asset Pricing*, Canadian Economics Association Conference, Ryerson University, Toronto, Canada, June: 1-72.

ODEAN, T., (1998): "Are Investors Reluctant to Realize Their Losses?" *Journal of Finance* 53: 1775-1798.

OFER, A. R., AND D. R. SIEGEL, (1987): "Corporate Financial Policy, Information, and Market Expectations: An Empirical Investigation of Dividends," *Journal of Finance* 42, no. 4, September: 889-911.

OLSON, G. T., AND P. D. MCCANN, (1994): "The Linkages between Dividends and Earnings," *The Financial Review* 29, no. 1, February: 1-22.

PARTINGTON, G. H., (1989): "Variables Influencing Dividend Policy in Australia: Survey Results," *Journal of Business Finance and Accounting* 16, no. 2, Spring: 165-82.

PATELL, J. M., (1976): "Corporate Forecasts of Earnings Per Share and Stock Price Behaviour: Empirical Tests," *Journal of Accounting Research* 14: 246-276.

PATELL, J. M., AND M. A. WOLFSON, (1984): "The Intraday Speed of Adjustment of Stock Prices to Earnings and Dividend Announcements," *Journal of Financial Economics* 13, no. 2, June: 223-252.

PENMAN, S. H., (1983): "The Predictive Content of Earnings Forecasts and Dividends," *Journal of Finance* 38, no. 4, September: 1181-1199.

PETTIT, R. R., (1972): "Dividend Announcements, Security Performance and Capital Market Efficiency," *Journal of Finance* 27: 993-1007.

PETTIT, R. R., (1977): "Taxes, Transactions Costs and the Clientele Effect of Dividends," *Journal of Financial Economics* 5, no. 3, December: 419-36.

PHILLIPS, A. L., H. K. BAKER, AND R. B. EDELMAN, (1997): "The Market Reaction to Discontinuing Regular Stock Dividends," *The Financial Review* 32, no. 4, November: 801-809.

PRICE, W. L. (1976): "A Controlled Random Search Procedure for Global Optimization," *The Computer Journal* 20: 48-53.

RAJ, M., AND D. THURSTON, (1995): "Predictive Ability of Earnings and Dividend Yields: An Empirical Evaluation of New Zealand Stocks," *Applied Financial Economics* 5, No. 2, April: 109-111.

ROBERTS, H. V., (1959): "Stock Market 'Patterns' and Financial Analysis: Methodological suggestions," *Journal of Finance* 14, March: 1-10.

ROLL, R., (1988): "R^2," *Journal of Finance* 43: 541-566.

ROSETT, R. N., (1959): "A Statistical Model of Friction in Economics," *Econometrica* 27: 263-267.

ROSS, S. A., (1977): "The Determination of Financial Structure: The Incentive-Signaling Approach," *Bell Journal of Economics* 8, no. 1, Spring: 23-40.

ROY, S. P., AND J. K. CHEUNG, (1985): "Target Payout and the Association between Dividends and Share Prices," *Accounting and Finance* 25, no. 2, November: 57-76.

ROZEFF, M. S., (1982): "Growth, Beta and Agency Costs as Determinants of Dividend Payout Ratios," *Journal of Financial Research* 5, no. 3, Fall: 249-59.

SAMUELSON, P. A., (1965): "Proof that Properly Anticipated Prices Fluctuate Randomly," *Industrial Management Review* 6, Spring: 41-49.

SANT, R., AND A. R. COWAN, (1994): "Do Dividends Signal Earnings? The Case of Omitted Dividends," *Journal of Banking and Finance* 18, no. 6, December: 1113-1133.

SCHOLES, M., AND J. WILLIAMS, (1977): "Estimating Betas from Nonsynchronous Data," *Journal of Financial Economics* 5, no. 3, December: 309-327.

SHARPE, W., (1964): "Capital Asset Prices: A Theory of Equilibrium under Conditions of Risk," *Journal of Finance* 19: 425-442.

SHEFRIN, H. M., AND M. STATMAN, (1984): "Explaining Investor Preference for Cash Dividends," *Journal of Financial Economics* 13, no. 2, June: 253-82.

STRONG, N., (1992): "Modelling Abnormal Returns: A Review Article," *Journal of Business Finance and Accounting* 19, no. 4, June: 533-552.

The Facts Book for the year ending 31 December 1996, New Zealand Stock Exchange, Wellington, New Zealand.

The Facts Book for the year ending 31 December 1997, New Zealand Stock Exchange, Wellington, New Zealand.

The Facts Book for the year ending 31 December 1998, New Zealand Stock Exchange, Wellington, New Zealand.

The Facts Book for the year ending 31 December 1999, New Zealand Stock Exchange, Wellington, New Zealand.

TRAVELOS, N., L. TRIGEORGIS, AND N. VAFEAS, (2001): "Shareholder Wealth Effects of Dividend Policy Changes in an Emerging Stock Market: The Case of Cyprus," *Multinational Finance Journal* 5, no. 2, June: 87-112.

VASICEK, O., (1973): "A Note on Using Cross-sectional Information in Bayesian Estimation of Security Betas," *Journal of Finance* 28: 1233-1239.

VENKATESH, P. C., (1989): "The Impact of Dividend Initiation on the Information Content of Earnings Announcements and Returns Volatility," *Journal of Business* 62, no. 2, April: 175-97.

VOS, E., AND R. TONG, (2001): "Dividend Without Signals in New Zealand," *Accounting Research Journal* 14, no. 2: 173-180.

WALLER, E. R., Y. M. BENDECK AND R. BHARGAVA, (1999): "The Market's Response to Recurring Events: The Case of Dividend Cuts," *Journal of Accounting and Finance Research* 6, no. 2, Spring: 35-47.

WANSLEY, J. W., AND W. R. LANE, (1987): "A Financial Profile of the Dividend Initiating Firm," *Journal of Business Finance and Accounting* 14: 425-36.

WATTS, R., (1973): "The Information Content of Dividends," *Journal of Business* 46, no. 2, April: 191-211.

WHITE, H., (1990): "A Heterskedasticity-consistent Covariance Matrix and a Direct Test for Heteroskedasticity," *Econometrica* 48: 721-746.

WOOLRIDGE, J. R., (1982): "The Information Content of Dividend Changes," *Journal of Financial Research* 5: 237-47.

WOOLRIDGE, J. R., AND C. GHOSH, (1985): "Dividend Cuts: Do they always Signal Bad News?" *Midland Corporate Finance Journal* 3: 20-32.

Appendix A The NZX and the NZ Economy in the 1980s

A brief tour of 1980s New Zealand history provides good reason for not employing 1980s sharemarket data — even if it were readily available. An excellent commentary on the decade is provided by Grant (1997), which provided much of the information sumarised here. In the decade, the country underwent economic upheaval starting in July 1984 with the election of the Lange/Douglas Labour Government and its embarkation upon a series of major economic reforms. There was a frenzy of speculation as people attempted to adapt, and to optimise their prospects in a new and unfamiliar market environment; and then there was the 1987 crash, which was locally much more severe in its impact than any share market or other economic reversal experienced in the 1990s.

Prior to the election of the Lange/Douglas government, New Zealand had been heavily regulated, had (by current standards) over-employment in government services, and even had a nationwide price-wage freeze in place.[179] The new government had two aims: to reduce public debt and to increase the country's competitiveness. Within his first four months, the new Minister of Finance, Roger Douglas removed interest rate controls, abolished restrictions on in-coming and outgoing foreign investment and ended the wage freeze. Four months later (March 1985), he floated the New Zealand exchange rate. This was followed up in 1987 with deregulation of the banking industry. In tandem with these changes, was a huge reduction in tariffs and the abolition of import controls (importers had previously been required to hold import licenses).

Given that New Zealand interest rates were high by world standards, foreign capital flooded inward and the New Zealand dollar appreciated significantly against the currencies of its trading partners. New Zealanders, also, for the first time in their lives, had the unrestricted right to deploy their wealth where and as they saw fit. The above factors stimulated a largely locally-fuelled share market bull run which lasted through till the October 1987 crash; but the market leaders were primarily property development firms and companies that were speculative investors in their own right — as distinct from companies with an established record of producing goods and services. The manoeuvrings of these companies captured much of the popular imagination; and these tumultuous events gave plenty of scope for the occurrence of confounding factors that would potentially obscure the dividend signalling picture.

Concurrent with these financial reforms, the Lange/Douglas Labour Government, also set about down-sizing the State Sector with a series of restructurings and privatisations which entailed making large numbers of employees redundant. The surge in unemployment was increased by Private Sector redundancies when manufacturing firms either went out of business or relocated their factories to where labour was cheaper, offshore. Further, the high exchange rate punished the agricultural sector, which was the main source of exports. Hence underneath the gung-ho effervescence of the 1984-1987 share market, the economy was not necessarily doing very well. By contrast, in the 1990s, most of the deregulatory reforms were in place and the speculative noise associated with them on the stock market had subsided. The economy was settling into

[179] This government was a Labour Party government; and the Prime Minister was David Lange. Traditionally, in the two-party system in place for most of the Twentieth Century, Labour was the left-wing party, while the National Party was the right-wing one. Both tended to be fairly centrist; but the 1984 Labour Government was much more right-wing than the preceding National Government. Currently New Zealand has a multi-party system; and it is interesting that a number of the leading politicians of the 1984 Labour Government later became founding members of the ACT Party, which is, economically speaking, at the far right of the political spectrum. One such politician was Roger Douglas, Minister of Finance in the 1984 and 1987 governments. (Elections are held every three years unless called earlier.)

recovery mode. The only major reform of the decade was the deregulation of the labour market in May 1991.[180]

When the October 1987 crash did occur, the New Zealand Stock Exchange fell further than those of New Zealand's trading partners; and the recovery from the bottom end of the business cycle lingered into the early 1990s.[181] The share market was severely downsized by the delisting of companies foundering as a result of the crash. In terms of the number of companies listed on the Exchange, the 361 of October 1987 had plummeted to 140 by April 1989. Similarly, from a high-point of $50.02 billion dollars on the eve of the crash, the NZX's total market capitalisation was reduced to a mere $14.5 billion dollars in January 1991 before beginning to grow again.[182] The market had been reduced to less than half its former size.

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[180] The Employment Contracts Act of 1991 had the effect of reducing the power of trade unions in the work place. The Act had a settling effect as distinct from a disruptive effect on the New Zealand economy in the 1990s.

[181] Grant (1997), p. 329. Consider first the rises, and then the falls. Between 1982 and October 1987, the NZX rose 600 percent, which was almost double the equivalent rise in the United Kingdom over the same period (350 percent), and over double the rise in U.S. share markets (250 percent). In Australia, the share market rose 400 percent. In the ten months following the crash, the New Zealand market fell 50 percent where the others' falls tended to be in the 25 – 30 percent range. Grant (p. 329) ascribes partial responsibility for this difference to the relative lack of foreign institutional investment in the New Zealand share market. Such investment might have acted as a brake. Further, "…the New Zealand market was small and narrowly based compared with New York, London and Australia, with the top twenty companies representing more than two-thirds of the market capitalisation. By October 1987 most of the twenty were unstable entrepreneurial and investment companies."

[182] Ibid, p. 308.

Appendix B Nature Company/events in the Study.

The company/events are described in this appendix by company code (coy), company name, industry code, the date of the announcement, and a short description of the company's business activity. There is a separate table for each year from 1990 to 1999. The coding for the industry is, by necessity, quite loose, as many firms are active in more than one industry; and some of them change the nature of their business over time.

The industry codes are:

Code	Description
AGS	Agriculture and associated services
AUT	Automotive
BLD	Building and construction
CHM	Chemical and fertilizer
ELE	Electrical
ENE	Energy and fuel
ENG	Engineering
FIN	Finance, banks and insurance
FOD	Food
FOR	Forestry and forest products
INV	Investments
LIQ	Liquor and tobacco
MET	Meat and by-products
MCM	Media and communications
MED	Medical supplies
MIN	Mining
MIS	Miscellaneous services
PRO	Property
RET	Retail merchants
TEX	Textile and apparel
TRN	Transport and tourism

1990

No	COY	INT/FIN	Name	Code	Date	Description
1	BNZ	1	BNZ Finance	FIN	15-Oct-90	Financial services
2	BRY	2	Brierley Investments Ltd	INV	27-Sep-90	Investment
3	CAV	2	Cavalier Corporation Ltd	TEX	29-Aug-90	Manufacturing - wool scouring and carpet
4	CEM	1	Ceramco Corporation Ltd	INV	11-Dec-90	Manufacturing - industrial and consumer products
5	DBG	2	Magnum Corporation Ltd	LIQ	29-Aug-90	Liquor industry production and distribution, hospitality
6	DON	2	Donaghys Ltd	TEX	7-Sep-90	Manufacturing - cordage, plastics, electronics
7	FAP	1	Fisher & Paykel Industries Ltd	ELE	2-Nov-90	Manufacturing - domestic appliances
8	FER	2	Fernz Corporation Ltd	CHM	26-Jul-90	Manufacturing - fertiliser and chemicals (agri-)
9	GMF	2	Goodman Fielder Ltd	FOD	25-Sep-90	Manufacturing - food processing
10	HLG	2	Hallenstein Glasson Holdings Ltd	RET	2-Oct-90	Retailing - clothing
11	MAI	2	Mair Astley Holdings Ltd	MET	13-Sep-90	Manufacturing and retailing - food, wool, leather
12	MBN	1	Milburn New Zealand Ltd	BLD	3-Sep-90	Manufacturing sand refining - cement, lime
13	MHI	2	Michael Hill International Ltd	RET	23-Aug-90	Manufacturing and retailing - jewellery
14	MON	2	Corporate Investments Ltd	INV	14-Sep-90	Investment, liquor industry
15	NPX	2	Nuplex Industries Ltd	CHM	24-Aug-90	Manufacturing - resins, chemicals

16	NZR	1	The New Zealand Refining Company Ltd	ENE	30-Aug-90	Manufacturing and Refining - petrol
17	OTR	2	Mineral Resources (NZ) Ltd	MIN	3-Oct-90	Mineral Resources - gold
18	OWN	1	Owens Group Ltd	TRN	7-Dec-90	Investment, transport
19	ROT	1	Radio Otago Ltd	MCM	13-Nov-90	Radio station
20	SEU	1	Amuri Corporation Ltd	PRO	2-Nov-90	Manufacturing and Retailing - motor vehicles
21	SSB	1	Salmond Smith Biolab Ltd	MED	12-Dec-90	Manufacturing & retailing - food, plastic, brushware, angora goat industry
22	WAM	1	Waste Management NZ Ltd	MIS	21-Aug-90	Service Utility - waste disposal
23	WHC	2	Rank Group Ltd	MIS	3-Sep-90	Retail - books, Printing
24	WHO	1	Wilson and Horton Ltd	MCM	26-Oct-90	Newspaper and Publishing

1991

No	COY	INT/FIN	Name	Code	Date	Description
1	AIRVA	2	Air New Zealand Ltd	TRN	1-Oct-91	Transport - air
2	APF	2	Apple Fields Ltd	AGS	19-Nov-91	Horticulture and agriculture (later property development)
3	BNZ	1	BNZ Finance Ltd	FIN	15-Oct-91	Financial services
4	BNZ	2	BNZ Finance Ltd	FIN	16-Apr-91	Financial services
5	BRY	2	Brierley Investments Ltd	INV	26-Sep-91	Investment
6	BWY	2	Broadway Industries Ltd	MIS	13-Sep-91	Manufacturing and retailing - business machines, sewing equipment
7	CAV	1	Cavalier Corporation Ltd	TEX	25-Feb-91	Manufacturing - wool scouring and carpet
8	CAV	2	Cavalier Corporation Ltd	TEX	29-Aug-91	Manufacturing - wool scouring and carpet
9	CEM	1	Ceramco Corporation Ltd	INV	21-Nov-91	Manufacturing - industrial and consumer products
10	CEM	2	Ceramco Corporation Ltd	INV	14-Jun-91	Manufacturing - industrial and consumer products
11	DBG	1	Magnum Corporation Ltd	LIQ	28-Feb-91	Liquor industry production and distribution, hospitality
12	DBG	2	Magnum Corporation Ltd	LIQ	30-Aug-91	Liquor industry production and distribution, hospitality
13	DMB	2	Damba Holdings Ltd	MIS	18-Jun-91	Manufacturing - furniture (also distributing)
14	DON	1	Donaghys Ltd	TEX	4-Mar-91	Manufacturing - cordage, plastics, electronics
15	DON	2	Donaghys Ltd	TEX	6-Sep-91	Manufacturing - cordage, plastics, electronics
16	EEQ	2	Eastern Equities Corporation Ltd	AGS	30-Oct-91	Horticulture and Agriculture
17	ERN	1	Ernest Adams Ltd	FOD	11-Nov-91	Food processing - cakes pastries
18	FAP	2	Fisher & Paykel Industries Ltd	ELE	7-Jun-91	Manufacturing - domestic appliances
19	FER	1	Fernz Corporation Ltd	CHM	15-Feb-91	Manufacturing - fertiliser ad chemicals (agri-)
20	FLC	1	Fletcher Challenge Ltd	FOR	14-Feb-91	Manufacturing, construction, Forestry, Agricultural
21	FRW	1	Fay Richwhite & Company Ltd	FIN	28-Feb-91	Investment, Financial services
22	FRW	2	Fay Richwhite & Company Ltd	FIN	18-Sep-91	Investment, Financial services
23	GMF	2	Goodman Fielder Ltd	FOD	20-Sep-91	Manufacturing - food processing
24	HLG	1	Hallenstein Glasson Holdings Ltd	RET	28-Mar-91	Retailing - clothing
25	HLG	2	Hallenstein Glasson Holdings Ltd	RET	20-Sep-91	Retailing - clothing
26	INL	1	Independent Newspapers Ltd	MCM	8-Feb-91	Newspaper publishers
27	LNN	1	Lion Nathan Ltd	LIQ	16-May-91	Liquor industry production and distribution, hospitality

28	MAI	2	Mair Astley Holdings Ltd	MET	26-Sep-91	Manufacturing and retailing - food, wool, leather
29	MBN	1	Milburn New Zealand Ltd	BLD	23-Aug-91	Manufacturing sand refining - cement, lime
30	MBN	2	Milburn New Zealand Ltd	BLD	8-Mar-91	Manufacturing sand refining - cement, lime
31	MHI	2	Michael Hill International Ltd	RET	21-Aug-91	Manufacturing and retailing - jewellery
32	MON	2	Corporate Investments Ltd	INV	16-Sep-91	Investment, liquor industry
33	MTG	1	Lasercorp Holdings Ltd	ELE	29-Nov-91	Distribution - electrical goods
34	NPX	2	Nuplex Industries Ltd	CHM	22-Aug-91	Manufacturing - resins, chemicals
35	NZR	1	The New Zealand Refining Company Ltd	ENE	29-Aug-91	Manufacturing and Refining - petrol
36	NZR	2	The New Zealand Refining Company Ltd	ENE	1-Mar-91	Manufacturing and Refining - petrol
37	OTR	2	Mineral Resources (NZ) Ltd	MIN	30-Sep-91	Mineral Resources - gold
38	OWN	1	Owens Group Ltd	TRN	18-Nov-91	Investment, transport
39	PYN	1	Paynter Corporation Ltd	PRO	4-Nov-91	Manufacturing and distribution - timber
40	RIL	2	Canterbury Roller Flour Mills Co Ltd	FOD	28-Jun-91	Food processing - flour milling
41	ROT	1	Radio Otago Ltd	MCM	20-Nov-91	Radio station
42	SAN	1	Sanford Ltd	FOD	2-May-91	Fisheries and aquaculture
43	SEU	2	Amuri Corporation Ltd	PRO	4-Jun-91	Manufacturing nd Retailing - motor vehicles
44	SHP	1	Shortland Properties Ltd	PRO	13-Sep-91	Property development, Investment
45	SHP	2	Shortland Properties Ltd	PRO	19-Mar-91	Property development, Investment
46	SSB	1	Salmond Smith Biolab Ltd	MED	12-Dec-91	Manufacturing and retailing - food, plastic, brushware, also anfora goat industry
47	STU	2	Steel & Tube Holdings Ltd	ENG	5-Jun-91	Manufacturing and retailing - vehicles, large items
48	TRK	2	Transmark Corporation Ltd	MIS	15-May-91	Manufactruing and Investment - electronics
49	WAM	1	Waste Management NZ Ltd	MIS	23-Aug-91	Service Utility - waste disposal
50	WAM	2	Waste Management NZ Ltd	MIS	5-Feb-91	Service Utility - waste disposal
51	WHC	1	Rank Group Ltd	MIS	25-Feb-91	Retail - books, Printing
52	WHC	2	Rank Group Ltd	MIS	5-Aug-91	Manufacturing and Retailing - motor vehicles
53	WHO	1	Wilson and Horton Ltd	MCM	4-Nov-91	Manufacturing and Retailing - motor vehicles

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No	COY	INTFIN	Name	Code	Date	Description
1	AIRVA	2	Air New Zealand Ltd	TRN	21-Sep-92	Transport - air
2	APF	2	Apple Fields Ltd	AGS	27-Nov-92	Horticulture and agriculture (later property development)
3	AQL	2	Regal salmon Ltd	AGS	19-Jun-92	Fisheries
4	BNZ	1	BNZ Finance Ltd	FIN	16-Oct-92	Financial services
5	BNZ	2	BNZ Finance Ltd	FIN	21-Apr-92	Financial services
6	BWY	2	Broadway Industries Ltd	MIS	16-Sep-92	Manufacturing and retailing - business machines, sewing equipment
7	CAH	2	Carter Holt Harvey Ltd	FOR	12-Jun-92	Manufacturing, distribution, fisheries - pulp, timber
8	CAV	2	Cavalier Corporation Ltd	TEX	20-Aug-92	Manufacturing - wool scouring and carpet
9	CEM	2	Ceramco Corporation Ltd	INV	29-May-92	Manufacturing - industrial and consumer products
10	CMO	1	The Colonial Motor Company Ltd	AUT	1-Apr-92	Retailing and Distribution - motor vehicles
11	CMO	2	The Colonial Motor Company Ltd	AUT	28-Sep-92	Retailing and Distribution - motor vehicles
12	DBG	1	DB Group Ltd	LIQ	4-Mar-92	Liquor industry production and distribution,

						hospitality
13	DBG	2	DB Group Ltd	LIQ	23-Sep-92	Liquor industry production and distribution, hospitality
14	DMB	1	Damba Holdings Ltd	MIS	4-Dec-92	Manufacturing - furniture (also distributing)
15	DMB	2	Damba Holdings Ltd	MIS	25-Jun-92	Manufacturing - furniture (also distributing)
16	DON	1	Donaghys Ltd	TEX	9-Mar-92	Manufacturing - cordage, plastics, electronics
17	DON	2	Donaghys Ltd	TEX	4-Sep-92	Manufacturing - cordage, plastics, electronics
18	EBO	2	Ebos Group Ltd	MED	1-Oct-92	Retailing and Distribution - hospital and surgical supplies
19	EEQ	1	Eastern Equities Corporation Ltd	AGS	6-May-92	Horticulture and Agriculture
20	ERN	2	Ernest Adams Ltd	FOD	29-May-92	Food processing - cakes pastries
21	FAP	2	Fisher & Paykel Industries Ltd	ELE	12-Jun-92	Manufacturing - domestic appliances
22	FER	1	Fernz Corporation Ltd	CHM	17-Feb-92	Manufacturing - fertiliser ad chemicals (agri-)
23	FLC	1	Fletcher Challenge Ltd	FOR	18-Feb-92	Manufacturing, construction, Forestry, Agricultural
24	FRW	2	Fay Richwhite & Company Ltd	FIN	17-Sep-92	Investment, Financial services
25	GMF	1	Goodman Fielder Ltd	FOD	6-Mar-92	Manufacturing - food processing
26	GMF	2	Goodman Fielder Ltd	FOD	11-Sep-92	Manufacturing - food processing
27	HLG	1	Hallenstein Glasson Holdings Ltd	RET	10-Apr-92	Retailing - clothing
28	HLG	2	Hallenstein Glasson Holdings Ltd	RET	25-Sep-92	Retailing - clothing
29	INL	1	Independent Newspapers Ltd	MCM	21-Feb-92	Newspaper publishers
30	INL	2	Independent Newspapers Ltd	MCM	21-Aug-92	Newspaper publishers
31	LNN	1	Lion Nathan Ltd	LIQ	4-May-92	Liquor industry production and distribution, hospitality
32	LNN	2	Lion Nathan Ltd	LIQ	4-Nov-92	Liquor industry production and distribution, hospitality
33	MAI	2	Mair Astley Holdings Ltd	MET	27-Aug-92	Manufacturing and retailing - food, wool, leather
34	MBN	1	Milburn New Zealand Ltd	BLD	21-Aug-92	Manufacturing sand refining - cement, lime
35	MBN	2	Milburn New Zealand Ltd	BLD	13-Mar-92	Manufacturing sand refining - cement, lime
36	MON	2	Corporate Investments Ltd	INV	1-Oct-92	Investment, liquor industry
37	MTG	1	Lasercorp Holdings Ltd	ELE	20-Nov-92	Distribution - electrical goods
38	NLL	1	New Zealand Light Leathers Ltd	MET	6-Mar-92	Manufacturing - Tanning industry
39	NLL	2	New Zealand Light Leathers Ltd	MET	11-Sep-92	Manufacturing - Tanning industry
40	NPX	2	Nuplex Industries Ltd	CHM	21-Aug-92	Manufacturing - resins, chemicals
41	NZR	1	The New Zealand Refining Company Ltd	ENE	27-Aug-92	Manufacturing and Refining - petrol
42	NZR	2	The New Zealand Refining Company Ltd	ENE	28-Feb-92	Manufacturing and Refining - petrol
43	OTR	2	Mineral Resources (NZ) Ltd	MIN	1-Oct-92	Mineral Resources - gold
44	OWN	1	Owens Group Ltd	TRN	20-Nov-92	Investment, transport
45	OWN	2	Owens Group Ltd	TRN	2-Jun-92	Investment, transport
46	PYN	1	Paynter Corporation Ltd	FOR	30-Nov-92	Manufacturing and distribution - timber
47	RCH	2	Mainzeal Group Ltd	INV	18-Sep-92	Property development, investment, construction
48	RIL	2	Canterbury Roller Flour Mills Co Ltd	FOD	25-Jun-92	Food processing - flour milling
49	ROT	2	Radio Otago Ltd	MCM	20-May-92	Radio station
50	RPA	2	Radio Pacific Ltd	MCM	19-Jun-92	Radio station
51	SAN	1	Sanford Ltd	FOD	4-May-92	Fisheries and aquaculture
52	SEU	1	Amuri Corporation Ltd	PRO	4-Nov-92	Manufacturing and Retailing - motor vehicles
53	SEU	2	Amuri Corporation Ltd	PRO	25-May-92	Manufacturing and Retailing - motor vehicles
54	SHP	2	Shortland Properties Ltd	PRO	30-Mar-92	Property development, Investment

55	SSB	1	Salmond Smith Biolab Ltd	MED	10-Dec-92	Manufacturing and retailing - food, plastic, brushware, also anfora goat industry
56	SSB	2	Salmond Smith Biolab Ltd	MED	5-Jun-92	Manufacturing and retailing - food, plastic, brushware, also anfora goat industry
57	TEL	1	Telecom Corporation of New Zealand Ltd	MCM	17-Nov-92	Service Utility - telecommunications
58	THL	1	The Helicopter Line Ltd	TRN	17-Nov-92	Services - tourism
59	THL	2	The Helicopter Line Ltd	TRN	8-Jun-92	Services - tourism
60	TRK	1	Transmark Corporation Ltd	MIS	19-Nov-92	Manufacturing and Investment - electronics
61	TRK	2	Transmark Corporation Ltd	MIS	25-May-92	Manufacturing and Investment - electronics
62	UBM	1	U-Bix Business Machines Ltd	MIS	21-Feb-92	Distribution - business equipment
63	WAM	1	Waste Management NZ Ltd	MIS	20-Aug-92	Service Utility - waste disposal
64	WAM	2	Waste Management NZ Ltd	MIS	21-Feb-92	Service Utility - waste disposal
65	WHC	1	Rank Group Ltd	MIS	3-Mar-92	Retail - books, printing
66	WHC	2	Rank Group Ltd	MIS	28-Sep-92	Retail - books, printing
67	WNE	1	Wilson Neill Ltd	INV	27-Mar-92	Liquor industry production and distribution, Property development
68	ZNZ	1	Stevens KMS Corporation Ltd	MED	20-Nov-92	Manufacturing and Distribution - medical, dental, pharmaceutical supplies

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No	COY	INTFIN	Name	Code	Date	Description
1	AIRVA	1	Air New Zealand Ltd	TRN	4-Mar-93	Transport - air
2	AIRVA	2	Air New Zealand Ltd	TRN	8-Sep-93	Transport - air
3	APF	2	Apple Fields Ltd	AGS	1-Dec-93	Horticulture and agriculture (later property development)
4	AQL	2	Regal salmon Ltd	AGS	24-Jun-93	Fisheries
5	ASN	1	Asian Properties Ltd	PRO	22-Dec-93	Investment, Property Development - in Asia
6	BNZ	1	BNZ Finance Ltd	FIN	22-Apr-93	Financial services
7	BNZ	2	BNZ Finance Ltd	FIN	22-Oct-93	Financial services
8	BWY	1	Broadway Industries Ltd	MIS	25-Feb-93	Manufacturing and retailing - business machines, sewing equipment
9	BWY	2	Broadway Industries Ltd	MIS	15-Sep-93	Manufacturing and retailing - business machines, sewing equipment
10	CAH	1	Carter Holt Harvey Ltd	FOR	10-Nov-93	Manufacturing, distribution, fisheries - pulp, timber
11	CAH	2	Carter Holt Harvey Ltd	FOR	28-May-93	Manufacturing, distribution, fisheries - pulp, timber
12	CAV	1	Cavalier Corporation Ltd	TEX	11-Feb-93	Manufacturing - wool scouring and carpet
13	CAV	2	Cavalier Corporation Ltd	TEX	26-Aug-93	Manufacturing - wool scouring and carpet
14	CEM	1	Ceramco Corporation Ltd	INV	11-Nov-93	Manufacturing - industrial and consumer products
15	CEM	2	Ceramco Corporation Ltd	INV	21-May-93	Manufacturing - industrial and consumer products
16	CMO	1	The Colonial Motor Company Ltd	AUT	30-Mar-93	Retailing and Distribution - motor vehicles
17	CMO	2	The Colonial Motor Company Ltd	AUT	24-Sep-93	Retailing and Distribution - motor vehicles
18	DMB	1	Damba Holdings Ltd	MIS	22-Dec-93	Manufacturing - furniture (also distributing)
19	DMB	2	Damba Holdings Ltd	MIS	19-May-93	Manufacturing - furniture (also distributing)
20	DON	1	Donaghys Ltd	TEX	5-Mar-93	Manufacturing - cordage, plastics, electronics
21	DON	2	Donaghys Ltd	TEX	3-Sep-93	Manufacturing - cordage, plastics, electronics
22	EBO	1	Ebos Group Ltd	MED	12-Mar-93	Retailing and Distribution - hospital and surgical supplies

23	EBO	2	Ebos Group Ltd	MED	1-Sep-93	Retailing and Distribution - hospital and surgical supplies
24	EEQ	1	Eastern Equities Corporation Ltd	AGS	26-Apr-93	Horticulture and Agriculture
25	EEQ	2	Eastern Equities Corporation Ltd	AGS	29-Oct-93	Horticulture and Agriculture
26	ERN	1	Ernest Adams Ltd	FOD	12-Nov-93	Food processing - cakes pastries
27	ERN	2	Ernest Adams Ltd	FOD	31-May-93	Food processing - cakes pastries
28	FAP	2	Fisher & Paykel Industries Ltd	ELE	4-Jun-93	Manufacturing - domestic appliances
29	FER	1	Fernz Corporation Ltd	CHM	12-Feb-93	Manufacturing - fertiliser ad chemicals (agri-)
30	FER	2	Fernz Corporation Ltd	CHM	22-Jul-93	Manufacturing - fertiliser ad chemicals (agri-)
31	FIR	1	Firestone NZ Ltd	AUT	16-Sep-93	Manufacturing - rubber tyres
32	FIR	2	Firestone NZ Ltd	AUT	1-Apr-93	Manufacturing - rubber tyres
33	FLC	1	Fletcher Challenge Ltd	FOR	17-Feb-93	Manufacturing, construction, Forestry, Agricultural
34	FLC	2	Fletcher Challenge Ltd	FOR	18-Aug-93	Manufacturing, construction, Forestry, Agricultural
35	FRW	1	Fay Richwhite & Company Ltd	FIN	4-Mar-93	Investment, Financial services
36	FRW	2	Fay Richwhite & Company Ltd	FIN	16-Sep-93	Investment, Financial services
37	FSL	1	Fruitfed Supplies Ltd	AGS	25-Nov-93	Horticulture and Distribution - of horticulteral products
38	GMF	2	Goodman Fielder Ltd	FOD	14-Sep-93	Manufacturing - food processing
39	HLG	1	Hallenstein Glasson Holdings Ltd	RET	26-Mar-93	Retailing - clothing
40	HLG	2	Hallenstein Glasson Holdings Ltd	RET	1-Oct-93	Retailing - clothing
41	LNN	1	Lion Nathan Ltd	LIQ	5-May-93	Liquor industry production and distribution, hospitality
42	LNN	2	Lion Nathan Ltd	LIQ	3-Nov-93	Liquor industry production and distribution, hospitality
43	MAI	2	Mair Astley Holdings Ltd	MET	16-Sep-93	Manufacturing and retailing - food, wool, leather
44	MBN	1	Milburn New Zealand Ltd	BLD	23-Aug-93	Manufacturing sand refining - cement, lime
45	MBN	2	Milburn New Zealand Ltd	BLD	15-Mar-93	Manufacturing sand refining - cement, lime
46	MHI	1	Michael Hill International Ltd	RET	18-Feb-93	Manufacturing and retailing - jewellery
47	MHI	2	Michael Hill International Ltd	RET	25-Aug-93	Manufacturing and retailing - jewellery
48	MMC	2	Macraes Mining Company Ltd	MIN	1-Mar-93	Construction, Property Development, Distribution - construction industry
49	MTG	1	Mastertrade Group Ltd	ELE	22-Nov-93	Distribution - electrical goods
50	NPX	1	Nuplex Industries Ltd	CHM	19-Feb-93	Manufacturing - resins, chemicals
51	NPX	2	Nuplex Industries Ltd	CHM	20-Aug-93	Manufacturing - resins, chemicals
52	NZR	1	The New Zealand Refining Company Ltd	ENE	26-Aug-93	Manufacturing and Retailing - motor vehicles
53	NZR	2	The New Zealand Refining Company Ltd	ENE	25-Feb-93	Manufacturing and Retailing - motor vehicles
54	OTR	1	Mineral Resources (NZ) Ltd	MIN	15-Mar-93	Mineral Resources - gold
55	OWN	1	Owens Group Ltd	TRN	3-Dec-93	Investment, transport
56	OWN	2	Owens Group Ltd	TRN	11-Jun-93	Investment, transport
57	PBF	2	Huttons Kiwi Ltd	MET	13-Aug-93	Food processing - beef
58	PDL	1	PDL Holdings Ltd	ELE	22-Nov-93	Manufacturing - plastics, electrical goods
59	POT	1	Port of Tauranga Ltd	TRN	5-May-93	Port management
60	POT	2	Port of Tauranga Ltd	TRN	29-Nov-93	Manufacturing and Investment - electronics
61	RCH	1	Mainzeal Group Ltd	INV	18-Mar-93	Manufacturing and Investment - electronics
62	RCH	2	Mainzeal Group Ltd	INV	20-Sep-93	Property development, investment, construction
63	REI	2	Reid Farmers Ltd	AGS	23-Aug-93	Agricultural services - stock and station agency
64	RIL	1	Canterbury Roller Flour Mills Co Ltd	FOD	10-Dec-93	Food processing - flour milling

65	RIL	2	Canterbury Roller Flour Mills Co Ltd	FOD	25-Jun-93	Retail - books, printing
66	ROT	1	Radio Otago Ltd	MCM	11-Nov-93	Retail - books, printing
67	ROT	2	Radio Otago Ltd	MCM	18-May-93	Radio station
68	RPA	1	Radio Pacific Ltd	MCM	30-Nov-93	Radio station
69	RPA	2	Radio Pacific Ltd	MCM	25-Jun-93	Radio station
70	SAN	1	Sanford Ltd	FOD	5-May-93	Fisheries and aquaculture
71	SAN	2	Sanford Ltd	FOD	5-Nov-93	Fisheries and aquaculture
72	SEU	2	Amuri Corporation Ltd	PRO	28-May-93	Manufacturing nd Retailing - motor vehicles
73	SHP	2	Shortland Properties Ltd	PRO	26-Mar-93	Property development, Investment
74	SOU	1	Southern Petroleum NL Ltd	MIN	17-Feb-93	Mineral Resources - Oil Exploration
75	SOU	2	Southern Petroleum NL Ltd	MIN	18-Aug-93	Mineral Resources - Oil Exploration
76	STU	1	Steel & Tube Holdings Ltd	ENG	3-Dec-93	Manufacturing and retailing - vehicles, large items
77	TAS	2	Tasman Agriculture Ltd	AGS	26-Aug-93	Agriculture - dairying
78	TEL	1	Telecom Corporation of New Zealand Ltd	MCM	2-Nov-93	Service Utility - telecommunications
79	TEL	2	Telecom Corporation of New Zealand Ltd	MCM	18-May-93	Service Utility - telecommunications
80	THL	2	The Helicopter Line Ltd	TRN	27-May-93	Services - tourism
81	TRK	1	Transmark Corporation Ltd	MIS	5-Nov-93	Manufactruing and Investment - electronics
82	TRK	2	Transmark Corporation Ltd	MIS	1-Jun-93	Manufactruing and Investment - electronics
83	UBM	1	U-Bix Business Machines Ltd	MIS	19-Feb-93	Distribution - business equipment
84	UBM	2	U-Bix Business Machines Ltd	MIS	20-Aug-93	Distribution - business equipment
85	WAM	1	Waste Management NZ Ltd	MIS	16-Aug-93	Service Utility - waste disposal
86	WAM	2	Waste Management NZ Ltd	MIS	1-Mar-93	Service Utility - waste disposal
87	WHC	2	Whitcoulls Group Ltd	MIS	30-Aug-93	Retail - books, Printing
88	WHO	2	Wilson and Horton Ltd	MCM	31-May-93	Newspaper and Publishing
89	ZNZ	1	Zuellig New Zealand Ltd	MED	29-Nov-93	Manufacturing and Distribution - medical, dental, pharmaceutical supplies
90	ZNZ	2	Zuellig New Zealand Ltd	MED	11-Jun-93	Manufacturing and Distribution - medical, dental, pharmaceutical supplies

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No	COY	INTFIN	Name	Code	Date	Description
1	AIRVA	2	Air New Zealand Ltd	TRN	7-Sep-94	Transport - air
2	APF	2	Apple Fields Ltd	AGS	5-Dec-94	Horticulture and agriculture (later property development)
3	ASN	2	Asian Properties Ltd	PRO	11-Jul-94	Investment, Property Development - in Asia
4	BNZ	1	BNZ Finance Ltd	FIN	20-Apr-94	Financial services
5	BNZ	2	BNZ Finance Ltd	FIN	19-Oct-94	Financial services
6	BRY	1	Brierley Investments Ltd	INV	3-Mar-94	Investment
7	BRY	2	Brierley Investments Ltd	INV	8-Sep-94	Investment
8	BWY	1	Broadway Industries Ltd	INV	2-Mar-94	Manufacturing and retailing - business machines, sewing equipment
9	CAH	2	Carter Holt Harvey Ltd	FOR	25-May-94	Manufacturing, distribution, fisheries - pulp, timber
10	CAV	2	Cavalier Corporation Ltd	TEX	25-Aug-94	Manufacturing - wool scouring and carpet
11	CEM	1	Ceramco Corporation Ltd	TEX	11-Nov-94	Manufacturing - industrial and consumer products

12	CEM	2	Ceramco Corporation Ltd	TEX	25-May-94	Manufacturing - industrial and consumer products
13	CMO	1	The Colonial Motor Company Ltd	AUT	30-Mar-94	Retailing and Distribution - motor vehicles
14	CMO	2	The Colonial Motor Company Ltd	AUT	23-Sep-94	Retailing and Distribution - motor vehicles
15	DMB	2	Damba Holdings Ltd	MIS	29-Jun-94	Manufacturing - furniture (also distributing)
16	DON	1	Donaghys Ltd	TEX	4-Mar-94	Manufacturing - cordage, plastics, electronics
17	DON	2	Donaghys Ltd	TEX	2-Sep-94	Manufacturing - cordage, plastics, electronics
18	EBO	1	Ebos Group Ltd	MED	16-Mar-94	Retailing and Distribution - hospital and surgical supplies
19	EEQ	1	Eastern Equities Corporation Ltd	AGS	6-May-94	Horticulture and Agriculture
20	EEQ	2	Eastern Equities Corporation Ltd	AGS	2-Nov-94	Horticulture and Agriculture
21	ENC	1	Enerco New Zealand Ltd	ENE	8-Nov-94	Distributing - natural gas
22	ENC	2	Enerco New Zealand Ltd	ENE	17-May-94	Distributing - natural gas
23	ERN	2	Ernest Adams Ltd	FOD	16-Jun-94	Food processing - cakes pastries
24	FAP	2	Fisher & Paykel Industries Ltd	ELE	2-Jun-94	Manufacturing - domestic appliances
25	FER	2	Fernz Corporation Ltd	CHM	22-Jul-94	Manufacturing - fertiliser ad chemicals (agri-)
26	FLC	1	Fletcher Challenge Ltd	FOR	23-Feb-94	Manufacturing, construction, Forestry, Agricultural
27	FLC	2	Fletcher Challenge Ltd	FOR	31-Aug-94	Manufacturing, construction, Forestry, Agricultural
28	FRW	1	Fay Richwhite & Company Ltd	FIN	8-Mar-94	Investment, Financial services
29	FRW	2	Fay Richwhite & Company Ltd	FIN	25-Aug-94	Investment, Financial services
30	FSL	1	Fruitfed Supplies Ltd	AGS	29-Nov-94	Horticulture and Distribution - of horticulteral products
31	FSL	2	Fruitfed Supplies Ltd	AGS	25-May-94	Horticulture and Distribution - of horticulteral products
32	GMF	2	Goodman Fielder Ltd	FOD	2-Sep-94	Manufacturing - food processing
33	GRC	2	Grocorp Pacific Ltd	AGS	22-Nov-94	Horticulture and Distribution - of horticultural products
34	HLG	1	Hallenstein Glasson Holdings Ltd	RET	31-Mar-94	Retailing - clothing
35	HLG	2	Hallenstein Glasson Holdings Ltd	RET	30-Sep-94	Retailing - clothing
36	LNN	1	Lion Nathan Ltd	LIQ	28-Apr-94	Liquor industry production and distribution, hospitality
37	LNN	2	Lion Nathan Ltd	LIQ	26-Oct-94	Liquor industry production and distribution, hospitality
38	MAI	1	Mair Astley Holdings Ltd	MET	16-Mar-94	Manufacturing and retailing - food, wool, leather
39	MBN	1	Milburn New Zealand Ltd	BLD	22-Aug-94	Manufacturing sand refining - cement, lime
40	MBN	2	Milburn New Zealand Ltd	BLD	14-Mar-94	Manufacturing sand refining - cement, lime
41	MCH	1	Mr Chips Holdings Ltd	FOD	25-Nov-94	Food Processing
42	MHI	1	Michael Hill International Ltd	RET	18-Feb-94	Manufacturing and retailing - jewellery
43	MHI	2	Michael Hill International Ltd	RET	18-Aug-94	Manufacturing and retailing - jewellery
44	MMC	2	Macraes Mining Company Ltd	MIN	4-Mar-94	Construction, Property Development, Distribution - construction industry
45	MTG	1	Mastertrade Group Ltd	ELE	18-Nov-94	Distribution - electrical goods
46	MTG	2	Mastertrade Group Ltd	ELE	10-Jun-94	Distribution - electrical goods
47	NCH	2	Natural Gas Corporation Holdings Ltd	ENE	25-Aug-94	Mineral resources - Natural Gas
48	NPR	2	New Zealand Rural Properties Ltd	AGS	7-Sep-94	Agriculture
49	NPX	1	Nuplex Industries Ltd	CHM	18-Feb-94	Manufacturing - resins, chemicals
50	NPX	2	Nuplex Industries Ltd	CHM	19-Aug-94	Manufacturing - resins, chemicals
51	NTH	1	Northland Port Corporation (NZ) Ltd	TRN	13-May-94	Port management
52	NTH	2	Northland Port Corporation (NZ) Ltd	TRN	24-Nov-94	Manufacturing and Retailing - motor vehicles

53	NZR	1	The New Zealand Refining Company Ltd	ENE	25-Aug-94	Manufacturing and Retailing - motor vehicles
54	OTR	1	Mineral Resources (NZ) Ltd	MIN	10-Mar-94	Mineral Resources - gold
55	OWN	1	Owens Group Ltd	TRN	30-Nov-94	Investment, transport
56	OWN	2	Owens Group Ltd	TRN	9-Jun-94	Investment, transport
57	PBF	1	Huttons Kiwi Ltd	MET	11-Feb-94	Food processing - beef
58	PBF	2	Huttons Kiwi Ltd	MET	12-Aug-94	Food processing - beef
59	PDL	1	PDL Holdings Ltd	ELE	18-Nov-94	Manufacturing - plastics, electrical goods
60	PDL	2	PDL Holdings Ltd	ELE	10-Jun-94	Manufacturing and Investment - electronics
61	POT	2	Port of Tauranga Ltd	TRN	21-Nov-94	Manufacturing and Investment - electronics
62	PRO	1	Progressive Enterprises Ltd	FOD	31-Mar-94	Retailing - food (supermarkets) and restaurant operator
63	PYN	1	Paynter Timber Group Ltd	FOR	15-Nov-94	Manufacturing and distribution - timber
64	RIL	2	Canterbury Roller Flour Mills Co Ltd	INV	29-Jun-94	Food processing - flour milling
65	ROT	1	Radio Otago Ltd	MCM	15-Nov-94	Retail - books, printing
66	ROT	2	Radio Otago Ltd	MCM	25-May-94	Retail - books, printing
67	RPA	1	Radio Pacific Ltd	MCM	25-Nov-94	Radio station
68	RPA	2	Radio Pacific Ltd	MCM	3-Jun-94	Radio station
69	SAN	1	Sanford Ltd	FOD	9-May-94	Fisheries and aquaculture
70	SAN	2	Sanford Ltd	FOD	9-Nov-94	Fisheries and aquaculture
71	SEU	2	Amuri Corporation Ltd	PRO	1-Jun-94	Manufacturing nd Retailing - motor vehicles
72	SHP	2	Shortland Properties Ltd	PRO	31-Mar-94	Property development, Investment
73	SJL	1	Shotover Jet Ltd	TRN	11-Nov-94	Services - tourism
74	SKL	2	Skellerup Group Ltd	MIS	11-Aug-94	Manufacturing and distribution - rubber
75	SOU	2	Southern Petroleum NL Ltd	MIN	18-Aug-94	Mineral Resources - Oil Exploration
76	STU	2	Steel & Tube Holdings Ltd	ENG	19-Aug-94	Manufacturing and retailing - vehicles, large items
77	TAS	1	Tasman Agriculture Ltd	AGS	25-Feb-94	Agriculture - dairying
78	TEL	1	Telecom Corporation of New Zealand Ltd	MCM	3-Nov-94	Service Utility - telecommunications
79	THL	1	The Helicopter Line Ltd	TRN	24-Feb-94	Services - tourism
80	THL	2	The Helicopter Line Ltd	TRN	15-Sep-94	Services - tourism
81	TRK	1	Transmark Corporation Ltd	ELE	17-Nov-94	Manufactruing and Investment - electronics
82	TRK	2	Transmark Corporation Ltd	ELE	16-May-94	Manufactruing and Investment - electronics
83	UBM	1	U-Bix Business Machines Ltd	MIS	22-Feb-94	Distribution - business equipment
84	UBM	2	U-Bix Business Machines Ltd	MIS	18-Aug-94	Distribution - business equipment
85	WAM	1	Waste Management NZ Ltd	MIS	22-Aug-94	Service Utility - waste disposal
86	WAM	2	Waste Management NZ Ltd	MIS	28-Feb-94	Service Utility - waste disposal
87	WHC	1	Whitcoulls Group Ltd	RET	7-Mar-94	Retail - books, Printing
88	WHC	2	Whitcoulls Group Ltd	RET	19-Sep-94	Retail - books, Printing
89	WHO	2	Wilson and Horton Ltd	MCM	30-May-94	Newspaper and Publishing
90	WKL	2	Williams and Kettle Ltd	AGS	30-Sep-94	Services - Agricultual, financial, stock and station agency
91	ZNZ	1	Zuellig New Zealand Ltd	MED	24-Nov-94	Manufacturing and Distribution - medical, dental, pharmaceutical supplies
92	ZNZ	2	Zuellig New Zealand Ltd	MED	10-Jun-94	Manufacturing and Distribution - medical, dental, pharmaceutical supplies

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No	COY	INTFIN	Name	Code	Date	Description
1	ADV	2	Advantage Group Ltd	MIS	31-Aug-95	Distribution - electronic equipment
2	AIRVA	1	Air New Zealand Ltd	TRN	17-Feb-95	Transport - air
3	AIRVA	2	Air New Zealand Ltd	TRN	5-Sep-95	Transport - air
4	ARB	2	Arthur Barnett Ltd	RET	29-Sep-95	Retailing
5	ASN	1	Asian Properties Ltd	PRO	11-Dec-95	Investment, Property Development - in Asia
6	ASN	2	Asian Properties Ltd	PRO	12-Jun-95	Investment, Property Development - in Asia
7	BCH	1	Baycorp Holdings Ltd	MIS	22-Feb-95	Financial Sevices - Debt collection, credit rating
8	BCH	2	Baycorp Holdings Ltd	MIS	9-Aug-95	Financial Sevices - Debt collection, credit rating
9	BNZ	1	BNZ Finance Ltd	FIN	19-Apr-95	Financial services
10	BNZ	2	BNZ Finance Ltd	FIN	18-Oct-95	Financial services
11	BRY	1	Brierley Investments Ltd	INV	2-Mar-95	Investment
12	BRY	2	Brierley Investments Ltd	INV	8-Sep-95	Investment
13	BWY	1	Broadway Industries Ltd	INV	28-Feb-95	Manufacturing and retailing - business machines, sewing equipment
14	BWY	2	Broadway Industries Ltd	INV	14-Sep-95	Manufacturing and retailing - business machines, sewing equipment
15	CAV	1	Cavalier Corporation Ltd	TEX	16-Feb-95	Manufacturing - wool scouring and carpet
16	CAV	2	Cavalier Corporation Ltd	TEX	1-Sep-95	Manufacturing - wool scouring and carpet
17	CED	2	Cedenco Foods Ltd	FOD	13-Dec-95	Horticulture -growing and processing
18	CEM	1	Ceramco Corporation Ltd	TEX	9-Nov-95	Manufacturing - industrial and consumer products
19	CEM	2	Ceramco Corporation Ltd	TEX	1-Jun-95	Manufacturing - industrial and consumer products
20	CMO	1	The Colonial Motor Company Ltd	AUT	16-Mar-95	Retailing and Distribution - motor vehicles
21	DBG	2	DB Group Ltd	LIQ	14-Dec-95	Liquor industry production and distribution, hospitality
22	DMB	2	Damba Holdings Ltd	MIS	15-Mar-95	Manufacturing - furniture (also distributing)
23	DON	1	Donaghys Ltd	TEX	3-Mar-95	Manufacturing - cordage, plastics, electronics
24	DON	2	Donaghys Ltd	TEX	1-Sep-95	Manufacturing - cordage, plastics, electronics
25	DTL	1	Designer Textiles NZ Ltd	TEX	21-Nov-95	Manufacturing - textiles
26	EBO	1	Ebos Group Ltd	MED	22-Feb-95	Retailing and Distribution - hospital and surgical supplies
27	EBO	2	Ebos Group Ltd	MED	23-Aug-95	Retailing and Distribution - hospital and surgical supplies
28	EEQ	1	Eastern Equities Corporation Ltd	AGS	3-May-95	Horticulture and Agriculture
29	EEQ	2	Eastern Equities Corporation Ltd	AGS	1-Nov-95	Horticulture and Agriculture
30	ENC	1	Enerco New Zealand Ltd	ENE	15-Nov-95	Distributing - natural gas
31	ENC	2	Enerco New Zealand Ltd	ENE	9-May-95	Distributing - natural gas
32	ERN	1	Ernest Adams Ltd	FOD	10-Nov-95	Food processing - cakes pastries
33	ERN	2	Ernest Adams Ltd	FOD	30-May-95	Food processing - cakes pastries
34	FAP	1	Fisher & Paykel Industries Ltd	ELE	3-Nov-95	Manufacturing - domestic appliances
35	FAP	2	Fisher & Paykel Industries Ltd	ELE	29-May-95	Manufacturing - domestic appliances
36	FER	1	Fernz Corporation Ltd	CHM	16-Feb-95	Manufacturing - fertiliser ad chemicals (agri-)
37	FER	2	Fernz Corporation Ltd	CHM	28-Jul-95	Manufacturing - fertiliser ad chemicals (agri-)
38	FIR	1	Firestone NZ Ltd	AUT	13-Sep-95	Manufacturing - rubber tyres
39	FLC	1	Fletcher Challenge Ltd	MIS	22-Feb-95	Manufacturing, construction, Forestry, Agricultural

40	FLC	2	Fletcher Challenge Ltd	MIS	30-Aug-95	Manufacturing, construction, Forestry, Agricultural
41	FLCF	2	Fletcher Challenge Ltd Forest Division	FOR	30-Aug-95	Horticulture - Forestry and Logging
42	FSL	1	Fruitfed Supplies Ltd	AGS	23-Nov-95	Horticulture and Distribution - of horticulteral products
43	FSL	2	Fruitfed Supplies Ltd	AGS	31-May-95	Horticulture and Distribution - of horticulteral products
44	GMF	1	Goodman Fielder Ltd	FOD	3-Mar-95	Manufacturing - food processing
45	GMF	2	Goodman Fielder Ltd	FOD	11-Sep-95	Manufacturing - food processing
46	GRC	2	Grocorp Pacific Ltd	AGS	30-Nov-95	Horticulture and Distribution - of horticultural products
47	HLG	1	Hallenstein Glasson Holdings Ltd	RET	4-Apr-95	Retailing - clothing
48	HLG	2	Hallenstein Glasson Holdings Ltd	RET	2-Oct-95	Retailing - clothing
49	INL	1	Independent Newspapers Ltd	MCM	17-Feb-95	Newspaper publishers
50	INL	2	Independent Newspapers Ltd	MCM	18-Aug-95	Newspaper publishers
51	LNN	2	Lion Nathan Ltd	LIQ	26-Oct-95	Liquor industry production and distribution, hospitality
52	LWR	1	LWR Industries Ltd	TEX	22-Feb-95	Manufacturing and Retailing - motor vehicles
53	LWR	2	LWR Industries Ltd	TEX	11-Aug-95	Manufacturing and Retailing - motor vehicles
54	MAI	2	Mair Astley Holdings Ltd	MET	12-Sep-95	Manufacturing and retailing - food, wool, leather
55	MBN	2	Milburn New Zealand Ltd	BLD	13-Mar-95	Manufacturing sand refining - cement, lime
56	MCH	2	Mr Chips Holdings Ltd	FOD	23-May-95	Food Processing
57	MHI	1	Michael Hill International Ltd	RET	15-Feb-95	Manufacturing and retailing - jewellery
58	MHI	2	Michael Hill International Ltd	RET	17-Aug-95	Manufacturing and retailing - jewellery
59	MMC	2	Macraes Mining Company Ltd	MIN	2-Mar-95	
60	MPL	1	McCollam Printers Ltd	MIS	4-Dec-95	Manufacturing and Investment - electronics
61	MTG	2	Mastertrade Group Ltd	ELE	9-Jun-95	Manufacturing and Investment - electronics
62	NCH	1	Natural Gas Corporation Holdings Ltd	ENE	16-Feb-95	Mineral resources - Natural Gas
63	NCH	2	Natural Gas Corporation Holdings Ltd	ENE	24-Aug-95	Mineral resources - Natural Gas
64	NPR	2	New Zealand Rural Properties Ltd	AGS	7-Sep-95	Agriculture
65	NPX	1	Nuplex Industries Ltd	CHM	17-Feb-95	Retail - books, printing
66	NPX	2	Nuplex Industries Ltd	CHM	18-Aug-95	Retail - books, printing
67	NTH	1	Northland Port Corporation (NZ) Ltd	TRN	19-May-95	Port management
68	NTH	2	Northland Port Corporation (NZ) Ltd	TRN	23-Nov-95	Port management
69	NZR	1	The New Zealand Refining Company Ltd	ENE	1-Sep-95	Manufacturing and Refining - petrol
70	NZR	2	The New Zealand Refining Company Ltd	ENE	23-Feb-95	Manufacturing and Refining - petrol
71	OWN	1	Owens Group Ltd	TRN	20-Nov-95	Investment, transport
72	OWN	2	Owens Group Ltd	TRN	31-May-95	Investment, transport
73	PBF	1	Pacific Beef Ltd	MET	20-Feb-95	Food processing - beef
74	PBF	2	Pacific Beef Ltd	MET	15-Aug-95	Food processing - beef
75	PDL	2	PDL Holdings Ltd	ELE	12-Jun-95	Manufacturing - plastics, electrical goods
76	POA	2	Ports of Auckland Ltd	TRN	15-Aug-95	Port management
77	POT	1	Port of Tauranga Ltd	TRN	8-May-95	Port management
78	PRG	1	Noel Leeming Ltd	RET	14-Nov-95	Retailing - home appliances
79	PRG	2	Noel Leeming Ltd	RET	29-May-95	Retailing - home appliances
80	PRO	1	Progressive Enterprises Ltd	FOD	23-Mar-95	Retailing - food (supermarkets) and restaurant

						operator
81	PRO	2	Progressive Enterprises Ltd	FOD	28-Sep-95	Retailing - food (supermarkets) and restaurant operator
82	PYN	1	Paynter Timber Group Ltd	FOR	15-Nov-95	Manufacturing and distribution - timber
83	REI	2	Reid Farmers Ltd	AGS	28-Aug-95	Agricultural services - stock and station agency
84	RNS	2	Triumph Industries Ltd	ENG	12-Jun-95	Distribution - computers
85	ROT	1	Radio Otago Ltd	MCM	22-Nov-95	Radio station
86	ROT	2	Radio Otago Ltd	MCM	16-May-95	Radio station
87	RPA	1	Radio Pacific Ltd	MCM	17-Nov-95	Radio station
88	RPA	2	Radio Pacific Ltd	MCM	19-May-95	Radio station
89	SAN	1	Sanford Ltd	FOD	3-May-95	Fisheries and aquaculture
90	SEU	1	Amuri Corporation Ltd	ENE	10-May-95	Investments - in Utilities such as electricity
91	SHP	2	Shortland Properties Ltd	PRO	8-Mar-95	Property development, Investment
92	SJL	1	Shotover Jet Ltd	TRN	4-Dec-95	Services - tourism
93	SJL	2	Shotover Jet Ltd	TRN	11-May-95	Services - tourism
94	SKL	1	Skellerup Group Ltd	MIS	9-Feb-95	Manufacturing and distribution - rubber
95	SOU	1	Southern Petroleum NL Ltd	MIN	20-Feb-95	Mineral Resources - Oil Exploration
96	SPN	2	Southport New Zealand Ltd	TRN	11-Sep-95	Port management
97	SSB	1	Salmond Smith Biolab Ltd	MIS	9-Mar-95	Manufacturing and retailing - food, plastic, brushware, also anfora goat industry
98	STU	1	Steel & Tube Holdings Ltd	ENG	10-Feb-95	Manufacturing and retailing - vehicles, large items
99	STU	2	Steel & Tube Holdings Ltd	ENG	23-Aug-95	Manufacturing and retailing - vehicles, large items
100	TAS	1	Tasman Agriculture Ltd	AGS	21-Feb-95	Agriculture - dairying
101	TAS	2	Tasman Agriculture Ltd	AGS	4-Aug-95	Agriculture - dairying
102	TAY	2	Taylors Group Ltd	MIS	29-Aug-95	Services - drycleaning and Property investment
103	TBK	1	Trust Bank New Zealand Ltd	FIN	29-Nov-95	Financial Services - banking
104	TEL	2	Telecom Corporation of New Zealand Ltd	MCM	12-May-95	Service Utility - telecommunications
105	THL	2	The Helicopter Line Ltd	TRN	13-Sep-95	Services - tourism
106	TPW	1	Trustpower Ltd	ENE	15-Nov-95	Service Utility - electricity
107	TRK	1	Transmark Corporation Ltd	ELE	13-Nov-95	Manufactruing and Investment - electronics
108	TRK	2	Transmark Corporation Ltd	ELE	18-May-95	Manufactruing and Investment - electronics
109	UBM	1	U-Bix Business Machines Ltd	MIS	22-Feb-95	Distribution - business equipment
110	UBM	2	U-Bix Business Machines Ltd	MIS	10-Aug-95	Distribution - business equipment
111	UGF	2	Underground Fashions Ltd	RET	5-Oct-95	Manufacturing and Retailing - clothing
112	WAM	1	Waste Management NZ Ltd	MIS	18-Aug-95	Service Utility - waste disposal
113	WAM	2	Waste Management NZ Ltd	MIS	23-Feb-95	Service Utility - waste disposal
114	WHC	1	Whitcoulls Group Ltd	RET	6-Mar-95	Retail - books, Printing
115	WHC	2	Whitcoulls Group Ltd	RET	7-Sep-95	Retail - books, Printing
116	WHO	2	Wilson and Horton Ltd	MCM	31-May-95	Newspaper and Publishing
117	WKL	1	Williams and Kettle Ltd	AGS	27-Mar-95	Services - Agricultual, financial, stock and station agency
118	WKL	2	Williams and Kettle Ltd	AGS	2-Oct-95	Services - Agricultual, financial, stock and station agency
119	WNG	1	Wang New Zealand Ltd	MIS	7-Feb-95	Distribution - computers
120	WNG	2	Wang New Zealand Ltd	MIS	8-Aug-95	Distribution - computers
121	WRI	1	Wrightson Ltd	AGS	23-Feb-95	Services - Agricultual, financial, stock and station agency

122	ZNZ	1	Zuellig New Zealand Ltd	MED	24-Nov-95	Manufacturing and Distribution - medical, dental, pharmaceutical supplies
123	ZNZ	2	Zuellig New Zealand Ltd	MED	12-Jun-95	Manufacturing and Distribution - medical, dental, pharmaceutical supplies

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No	COY	INTFIN	Name	Code	Date	Description
1	ADV	1	Advantage Group Ltd	MIS	4-Mar-96	Distribution - electronic equipment
2	ADV	2	Advantage Group Ltd	MIS	30-Aug-96	Distribution - electronic equipment
3	AFF	1	AFFCO Holdings Ltd	MET	31-May-96	Food processing - meat
4	AFF	2	AFFCO Holdings Ltd	MET	14-Nov-96	Food processing - meat
5	AIRVA	1	Air New Zealand Ltd	TRN	23-Feb-96	Transport - air
6	AIRVA	2	Air New Zealand Ltd	TRN	2-Sep-96	Transport - air
7	ARB	1	Arthur Barnett Ltd	RET	25-Mar-96	Retailing
8	ARB	2	Arthur Barnett Ltd	RET	7-Oct-96	Retailing
9	ASN	2	Asian Properties Ltd	PRO	5-Jun-96	Investment, Property Development - in Asia
10	BCH	1	Baycorp Holdings Ltd	MIS	20-Feb-96	Financial Sevices - Debt collection, credit rating
11	BRY	1	Brierley Investments Ltd	INV	7-Mar-96	Investment
12	BRY	2	Brierley Investments Ltd	INV	5-Sep-96	Investment
13	BWY	1	Broadway Industries Ltd	INV	1-Mar-96	Manufacturing and retailing - business machines, sewing equipment
14	BWY	2	Broadway Industries Ltd	INV	3-Sep-96	Manufacturing and retailing - business machines, sewing equipment
15	CAH	1	Carter Holt Harvey Ltd	FOR	6-Nov-96	Manufacturing, distribution, fisheries - pulp, timber
16	CAH	2	Carter Holt Harvey Ltd	FOR	8-May-96	Manufacturing, distribution, fisheries - pulp, timber
17	CAV	1	Cavalier Corporation Ltd	TEX	16-Feb-96	Manufacturing - wool scouring and carpet
18	CAV	2	Cavalier Corporation Ltd	TEX	30-Aug-96	Manufacturing - wool scouring and carpet
19	CED	1	Cedenco Foods Ltd	FOD	17-Jun-96	Horticulture -growing and processing
20	CED	2	Cedenco Foods Ltd	FOD	16-Dec-96	Horticulture -growing and processing
21	CEM	1	Ceramco Corporation Ltd	TEX	20-Nov-96	Manufacturing - industrial and consumer products
22	CEM	2	Ceramco Corporation Ltd	TEX	30-May-96	Manufacturing - industrial and consumer products
23	CMO	1	The Colonial Motor Company Ltd	AUT	29-Feb-96	Retailing and Distribution - motor vehicles
24	CMO	2	The Colonial Motor Company Ltd	AUT	13-Sep-96	Retailing and Distribution - motor vehicles
25	DBG	2	DB Group Ltd	LIQ	11-Dec-96	Liquor industry production and distribution, hospitality
26	DCP	2	Direct Capital Partners Ltd	INV	13-Sep-96	Investment - unlistec companies
27	DMB	2	Damba Holdings Ltd	MIS	4-Mar-96	Manufacturing - furniture (also distributing)
28	DON	1	Donaghys Ltd	TEX	8-Mar-96	Manufacturing - cordage, plastics, electronics
29	DTL	2	Designer Textiles NZ Ltd	TEX	17-May-96	Manufacturing - textiles
30	EBO	1	Ebos Group Ltd	MED	21-Feb-96	Retailing and Distribution - hospital and surgical supplies
31	EBO	2	Ebos Group Ltd	MED	20-Aug-96	Retailing and Distribution - hospital and surgical supplies
32	EEQ	1	Eastern Equities Corporation Ltd	AGS	13-May-96	Horticulture and Agriculture
33	EEQ	2	Eastern Equities Corporation Ltd	AGS	25-Oct-96	Horticulture and Agriculture
34	ENC	1	Enerco New Zealand Ltd	ENE	13-Nov-96	Distributing - natural gas
35	ENC	2	Enerco New Zealand Ltd	ENE	8-May-96	Distributing - natural gas

36	ERN	1	Ernest Adams Ltd	FOD	13-Dec-96	Food processing - cakes pastries
37	ERN	2	Ernest Adams Ltd	FOD	12-Jun-96	Food processing - cakes pastries
38	FAP	2	Fisher & Paykel Industries Ltd	ELE	7-Jun-96	Manufacturing - domestic appliances
39	FER	2	Fernz Corporation Ltd	CHM	29-Jul-96	Manufacturing - fertiliser ad chemicals (agri-)
40	FIR	1	Firestone NZ Ltd	AUT	5-Sep-96	Manufacturing - rubber tyres
41	FLC	1	Fletcher Challenge Ltd	MIS	28-Feb-96	Manufacturing, construction, Forestry, Agricultural
42	FLCF	1	Fletcher Challenge Ltd Forest Division	FOR	28-Feb-96	Horticulture - Forestry and Logging
43	FLCF	2	Fletcher Challenge Ltd Forest Division	FOR	28-Aug-96	Horticulture - Forestry and Logging
44	FOR	1	Force Corporation Ltd	MIS	22-Feb-96	Property Development, Services - cinema
45	FOR	2	Force Corporation Ltd	MIS	15-Aug-96	Property Development, Services - cinema
46	FSL	1	Fruitfed Supplies Ltd	AGS	26-Nov-96	Horticulture and Distribution - of horticulteral products
47	FSL	2	Fruitfed Supplies Ltd	AGS	29-May-96	Horticulture and Distribution - of horticulteral products
48	GMF	1	Goodman Fielder Ltd	FOD	7-Mar-96	Manufacturing - food processing
49	GMF	2	Goodman Fielder Ltd	FOD	5-Sep-96	Manufacturing - food processing
50	HBY	2	Hellaby Holdings Ltd	INV	3-Sep-96	Investment - in manufacturing and retail companies
51	HLG	1	Hallenstein Glasson Holdings Ltd	RET	29-Mar-96	Retailing - clothing
52	HLG	2	Hallenstein Glasson Holdings Ltd	RET	4-Oct-96	Manufacturing and Retailing - motor vehicles
53	IFT	1	Infrastructure & Utilites NZ Ltd	INV	23-Oct-96	Manufacturing and Retailing - motor vehicles
54	IFT	2	Infrastructure & Utilites NZ Ltd	INV	8-May-96	Investment
55	INL	1	Independent Newspapers Ltd	MCM	16-Feb-96	Newspaper publishers
56	INL	2	Independent Newspapers Ltd	MCM	16-Aug-96	Newspaper publishers
57	LNN	1	Lion Nathan Ltd	LIQ	18-Apr-96	Liquor industry production and distribution, hospitality
58	LNN	2	Lion Nathan Ltd	LIQ	31-Oct-96	Liquor industry production and distribution, hospitality
59	LWR	1	LWR Industries Ltd	TEX	23-Feb-96	Manufacturing - textiles
60	LWR	2	LWR Industries Ltd	TEX	9-Aug-96	Manufacturing and Investment - electronics
61	MBN	1	Milburn New Zealand Ltd	BLD	26-Aug-96	Manufacturing and Investment - electronics
62	MBN	2	Milburn New Zealand Ltd	BLD	11-Mar-96	Manufacturing sand refining - cement, lime
63	MCH	1	Mr Chips Holdings Ltd	FOD	6-Nov-96	Food Processing
64	MCH	2	Mr Chips Holdings Ltd	FOD	22-May-96	Food Processing
65	MET	1	Metropolitan Lifecare Group Ltd	MIS	2-Sep-96	Retail - books, printing
66	MET	2	Metropolitan Lifecare Group Ltd	MIS	14-Mar-96	Retail - books, printing
67	MHI	1	Michael Hill International Ltd	RET	16-Feb-96	Manufacturing and retailing - jewellery
68	MHI	2	Michael Hill International Ltd	RET	15-Aug-96	Manufacturing and retailing - jewellery
69	MPL	1	McCollam Printers Ltd	MIS	22-Nov-96	Printing
70	MPL	2	McCollam Printers Ltd	MIS	23-May-96	Printing
71	NCH	2	Natural Gas Corporation Holdings Ltd	ENE	21-Aug-96	Mineral resources - Natural Gas
72	NPR	2	New Zealand Rural Properties Ltd	AGS	26-Aug-96	Agriculture
73	NPX	1	Nuplex Industries Ltd	CHM	23-Feb-96	Manufacturing - resins, chemicals
74	NPX	2	Nuplex Industries Ltd	CHM	23-Aug-96	Manufacturing - resins, chemicals
75	NTH	1	Northland Port Corporation (NZ) Ltd	TRN	17-May-96	Port management
76	NTH	2	Northland Port Corporation (NZ) Ltd	TRN	21-Nov-96	Port management

77	NZR	1	The New Zealand Refining Company Ltd	ENE	29-Aug-96	Manufacturing and Refining - petrol
78	NZR	2	The New Zealand Refining Company Ltd	ENE	22-Feb-96	Manufacturing and Refining - petrol
79	OWN	1	Owens Group Ltd	TRN	27-Nov-96	Investment, transport
80	PBF	1	Pacific Beef Ltd	MET	19-Feb-96	Food processing - beef
81	PDL	1	PDL Holdings Ltd	ELE	12-Nov-96	Manufacturing - plastics, electrical goods
82	PDL	2	PDL Holdings Ltd	ELE	7-Jun-96	Manufacturing - plastics, electrical goods
83	POA	1	Ports of Auckland Ltd	TRN	13-Feb-96	Port management
84	POA	2	Ports of Auckland Ltd	TRN	13-Aug-96	Port management
85	POT	1	Port of Tauranga Ltd	TRN	16-Feb-96	Port management
86	POT	2	Port of Tauranga Ltd	TRN	26-Aug-96	Port management
87	PRG	1	Pacific Retail Group Ltd	RET	2-Dec-96	Retailing - home appliances
88	PRG	2	Pacific Retail Group Ltd	RET	29-May-96	Retailing - home appliances
89	PRO	1	Progressive Enterprises Ltd	FOD	1-Apr-96	Retailing - food (supermarkets) and restaurant operator
90	PRO	2	Progressive Enterprises Ltd	FOD	30-Sep-96	Retailing - food (supermarkets) and restaurant operator
91	PYN	2	Paynter Timber Group Ltd	FOR	13-May-96	Manufacturing and distribution - timber
92	REI	2	Reid Farmers Ltd	AGS	26-Aug-96	Agricultural services - stock and station agency
93	RNS	1	Triumph Industries Ltd	ENG	6-Aug-96	Distribution - computers
94	ROT	1	Radio Otago Ltd	MCM	26-Nov-96	Radio station
95	ROT	2	Radio Otago Ltd	MCM	20-May-96	Radio station
96	RPA	1	Radio Pacific Ltd	MCM	29-Nov-96	Radio station
97	RPA	2	Radio Pacific Ltd	MCM	31-May-96	Radio station
98	SAN	1	Sanford Ltd	FOD	3-May-96	Fisheries and aquaculture
99	SEU	1	South Eastern Utilities Ltd	INV	2-Feb-96	Investments - in Utilities such as electricity
100	SEU	2	South Eastern Utilities Ltd	INV	15-Aug-96	Investments - in Utilities such as electricity
101	SFH	1	Seafresh New Zealand Ltd	FOD	21-Jun-96	Fisheries
102	SHP	2	Shortland Properties Ltd	PRO	12-Mar-96	Property development, Investment
103	SJL	1	Shotover Jet Ltd	TRN	10-Dec-96	Services - tourism
104	SJL	2	Shotover Jet Ltd	TRN	17-Jun-96	Services - tourism
105	SPN	1	Southport New Zealand Ltd	TRN	26-Feb-96	Port management
106	SPN	2	Southport New Zealand Ltd	TRN	6-Sep-96	Port management
107	STL	1	St Lukes Group Ltd	PRO	16-Feb-96	Retailing - supermarkets
108	STL	2	St Lukes Group Ltd	PRO	16-Aug-96	Retailing - supermarkets
109	STU	1	Steel & Tube Holdings Ltd	ENG	21-Feb-96	Manufacturing and retailing - vehicles, large items
110	STU	2	Steel & Tube Holdings Ltd	ENG	21-Aug-96	Manufacturing and retailing - vehicles, large items
111	TAS	1	Tasman Agriculture Ltd	AGS	14-Feb-96	Agriculture - dairying
112	TAS	2	Tasman Agriculture Ltd	AGS	14-Aug-96	Agriculture - dairying
113	TAY	1	Taylors Group Ltd	MIS	13-Mar-96	Services - drycleaning and Property investment
114	TAY	2	Taylors Group Ltd	MIS	4-Sep-96	Services - drycleaning and Property investment
115	TBK	2	Trust Bank New Zealand Ltd	FIN	31-May-96	Financial Services - banking
116	THL	1	Tourism Holdings Ltd	TRN	18-Mar-96	Services - tourism
117	THL	2	Tourism Holdings Ltd	TRN	12-Sep-96	Services - tourism
118	TPW	1	Trustpower Ltd	ENE	12-Nov-96	Service Utility - electricity
119	TPW	2	Trustpower Ltd	ENE	28-May-96	Service Utility - electricity
120	TRK	1	Transmark Corporation Ltd	ELE	19-Aug-96	Manufactruing and Investment - electronics

121	TTP	1	Trans Tasman Properties Ltd	PRO	23-Aug-96	Property Investment
122	UGF	1	Underground Fashions Ltd	RET	4-Apr-96	Manufacturing and Retailing - clothing
123	UGF	2	Underground Fashions Ltd	RET	16-Oct-96	Manufacturing and Retailing - clothing
124	UNL	2	Power New Zealand Ltd	ENE	27-May-96	Service Utility - electricity
125	WEL	2	Wairarapa Electricity Ltd	ENE	22-May-96	Service Utility - electricity
126	WHO	1	Wilson and Horton Ltd	MCM	23-Aug-96	Newspaper and Publishing
127	WKL	1	Williams and Kettle Ltd	AGS	1-Apr-96	Services - Agricultual, financial, stock and station agency
128	WKL	2	Williams and Kettle Ltd	AGS	30-Sep-96	Services - Agricultual, financial, stock and station agency
129	WNG	1	Wang New Zealand Ltd	MIS	13-Feb-96	Distribution - computers
130	WRI	1	Wrightson Ltd	AGS	7-Mar-96	Services - Agricultual, financial, stock and station agency
131	WRI	2	Wrightson Ltd	AGS	6-Sep-96	Services - Agricultual, financial, stock and station agency
132	ZNZ	1	Zuellig New Zealand Ltd	MED	29-Nov-96	Manufacturing and Distribution - medical, dental, pharmaceutical supplies

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No	COY	INTFIN	Name	Code	Date	Description
1	ADV	1	Advantage Group Ltd	MIS	14-Feb-97	Distribution - electronic equipment
2	ADV	2	Advantage Group Ltd	MIS	15-Sep-97	Distribution - electronic equipment
3	AFF	1	AFFCO Holdings Ltd	MET	29-May-97	Food processing - meat
4	AFF	2	AFFCO Holdings Ltd	MET	14-Nov-97	Food processing - meat
5	AIRVA	1	Air New Zealand Ltd	TRN	19-Feb-97	Transport - air
6	AIRVA	2	Air New Zealand Ltd	TRN	2-Sep-97	Transport - air
7	ARB	1	Arthur Barnett Ltd	RET	20-Mar-97	Retailing
8	ARB	2	Arthur Barnett Ltd	RET	8-Oct-97	Retailing
9	ASN	2	Asian Properties Ltd	PRO	5-Jun-97	Investment, Property Development - in Asia
10	BCH	1	Baycorp Holdings Ltd	MIS	20-Feb-97	Financial Sevices - Debt collection, credit rating
11	BCH	2	Baycorp Holdings Ltd	MIS	12-Aug-97	Financial Sevices - Debt collection, credit rating
12	BOA	1	J. Boag and Son Ltd	LIQ	7-Mar-97	Liquor Industry
13	BOA	2	J. Boag and Son Ltd	LIQ	17-Sep-97	Liquor Industry
14	BRY	1	Brierley Investments Ltd	INV	6-Mar-97	Investment
15	BRY	2	Brierley Investments Ltd	INV	4-Sep-97	Investment
16	BWY	2	Broadway Industries Ltd	INV	12-Sep-97	Manufacturing and retailing - business machines, sewing equipment
17	CAH	1	Carter Holt Harvey Ltd	FOR	6-Nov-97	Manufacturing, distribution, fisheries - pulp, timber
18	CAH	2	Carter Holt Harvey Ltd	FOR	13-May-97	Manufacturing, distribution, fisheries - pulp, timber
19	CAV	1	Cavalier Corporation Ltd	TEX	14-Feb-97	Manufacturing - wool scouring and carpet
20	CAV	2	Cavalier Corporation Ltd	TEX	29-Aug-97	Manufacturing - wool scouring and carpet
21	CDI	2	CDL Investments New Zealand Ltd	PRO	3-Mar-97	Property developer
22	CDL	2	CDL Hotels New Zealand Ltd	INV	3-Mar-97	Investment - hotel industry
23	CEM	1	Ceramco Corporation Ltd	TEX	20-Nov-97	Manufacturing - industrial and consumer products
24	CEM	2	Ceramco Corporation Ltd	TEX	29-May-97	Manufacturing - industrial and consumer products
25	DBG	1	DB Group Ltd	LIQ	11-Jun-97	Liquor industry production and distribution, hospitality

26	DBG	2	DB Group Ltd	LIQ	10-Dec-97	Liquor industry production and distribution, hospitality
27	DCP	2	Direct Capital Partners Ltd	INV	26-Aug-97	Investment - unlistec companies
28	DON	1	Donaghys Ltd	TEX	7-Mar-97	Manufacturing - cordage, plastics, electronics
29	DON	2	Donaghys Ltd	TEX	29-Aug-97	Manufacturing - cordage, plastics, electronics
30	DTL	1	Designer Textiles NZ Ltd	TEX	25-Feb-97	Manufacturing - textiles
31	DTL	2	Designer Textiles NZ Ltd	TEX	26-Aug-97	Manufacturing - textiles
32	EBO	1	Ebos Group Ltd	MED	24-Feb-97	Retailing and Distribution - hospital and surgical supplies
33	EBO	2	Ebos Group Ltd	MED	12-Sep-97	Retailing and Distribution - hospital and surgical supplies
34	EEQ	1	Eastern Equities Corporation Ltd	AGS	23-Apr-97	Horticulture and Agriculture
35	EEQ	2	Eastern Equities Corporation Ltd	AGS	23-Oct-97	Horticulture and Agriculture
36	ENC	1	Enerco New Zealand Ltd	ENE	4-Nov-97	Distributing - natural gas
37	ENC	2	Enerco New Zealand Ltd	ENE	16-May-97	Distributing - natural gas
38	ERN	1	Ernest Adams Ltd	FOD	12-Dec-97	Food processing - cakes pastries
39	ERN	2	Ernest Adams Ltd	FOD	5-Jun-97	Food processing - cakes pastries
40	FAP	2	Fisher & Paykel Industries Ltd	ELE	6-Jun-97	Manufacturing - domestic appliances
41	FER	1	Fernz Corporation Ltd	CHM	5-Feb-97	Manufacturing - fertiliser ad chemicals (agri-)
42	FER	2	Fernz Corporation Ltd	CHM	30-Jul-97	Manufacturing - fertiliser ad chemicals (agri-)
43	FLCF	1	Fletcher Challenge Ltd Forest Division	FOR	26-Feb-97	Horticulture - Forestry and Logging
44	FLCF	2	Fletcher Challenge Ltd Forest Division	FOR	20-Aug-97	Horticulture - Forestry and Logging
45	FOR	2	Force Corporation Ltd	MIS	21-Aug-97	Property Development, Services - cinema
46	FSL	1	Fruitfed Supplies Ltd	AGS	27-Nov-97	Horticulture and Distribution - of horticulteral products
47	FSL	2	Fruitfed Supplies Ltd	AGS	28-May-97	Horticulture and Distribution - of horticulteral products
48	GMF	2	Goodman Fielder Ltd	FOD	5-Sep-97	Manufacturing - food processing
49	HBY	1	Hellaby Holdings Ltd	INV	24-Feb-97	Investment - in manufacturing and retail companies
50	HBY	2	Hellaby Holdings Ltd	INV	8-Sep-97	Investment - in manufacturing and retail companies
51	HED	1	Bay of Plenty Electricity Ltd	ENE	10-Nov-97	Service Utility - electricity
52	HED	2	Bay of Plenty Electricity Ltd	ENE	21-May-97	Manufacturing and Retailing - motor vehicles
53	HLG	1	Hallenstein Glasson Holdings Ltd	RET	24-Mar-97	Manufacturing and Retailing - motor vehicles
54	HLG	2	Hallenstein Glasson Holdings Ltd	RET	30-Sep-97	Retailing - clothing
55	IFT	2	Infrastructure & Utilites NZ Ltd	INV	7-May-97	Investment
56	INL	1	Independent Newspapers Ltd	MCM	24-Feb-97	Newspaper publishers
57	INL	2	Independent Newspapers Ltd	MCM	15-Aug-97	Newspaper publishers
58	JFA	2	Jardine Fleming Asia Pacific Ltd	INV	22-Aug-97	Investment - Asia
59	LNN	1	Lion Nathan Ltd	LIQ	28-Apr-97	Liquor industry production and distribution, hospitality
60	LNN	2	Lion Nathan Ltd	LIQ	30-Oct-97	Manufacturing and Investment - electronics
61	LWR	1	LWR Industries Ltd	TEX	26-Feb-97	Manufacturing and Investment - electronics
62	LWR	2	LWR Industries Ltd	TEX	13-Aug-97	Manufacturing - textiles
63	MBN	1	Milburn New Zealand Ltd	BLD	25-Aug-97	Manufacturing sand refining - cement, lime
64	MBN	2	Milburn New Zealand Ltd	BLD	10-Mar-97	Manufacturing sand refining - cement, lime
65	MCH	1	Mr Chips Holdings Ltd	FOD	20-Nov-97	Retail - books, printing

66	MCH	2	Mr Chips Holdings Ltd	FOD	15-May-97	Retail - books, printing
67	MDL	2	McConnell Dowell Corporation Ltd	BLD	15-Sep-97	Construction
68	MET	1	Metropolitan Lifecare Group Ltd	MIS	13-Aug-97	Services - retirement villages
69	MET	2	Metropolitan Lifecare Group Ltd	MIS	5-Mar-97	Services - retirement villages
70	MFT	1	Mainfreight Ltd	TRN	10-Nov-97	Transport
71	MHI	1	Michael Hill International Ltd	RET	25-Feb-97	Manufacturing and retailing - jewellery
72	MHI	2	Michael Hill International Ltd	RET	12-Aug-97	Manufacturing and retailing - jewellery
73	NCH	1	Natural Gas Corporation Holdings Ltd	ENE	19-Feb-97	Mineral resources - Natural Gas
74	NLL	2	New Zealand Light Leathers Ltd	MET	14-Feb-97	Manufacturing - Tanning industry
75	NPX	1	Nuplex Industries Ltd	CHM	21-Feb-97	Manufacturing - resins, chemicals
76	NPX	2	Nuplex Industries Ltd	CHM	22-Aug-97	Manufacturing - resins, chemicals
77	NTH	1	Northland Port Corporation (NZ) Ltd	TRN	16-May-97	Port management
78	NTH	2	Northland Port Corporation (NZ) Ltd	TRN	20-Nov-97	Port management
79	NZR	1	The New Zealand Refining Company Ltd	ENE	28-Aug-97	Manufacturing and Refining - petrol
80	NZR	2	The New Zealand Refining Company Ltd	ENE	27-Feb-97	Manufacturing and Refining - petrol
81	PDL	1	PDL Holdings Ltd	ELE	11-Nov-97	Manufacturing - plastics, electrical goods
82	PDL	2	PDL Holdings Ltd	ELE	4-Jun-97	Manufacturing - plastics, electrical goods
83	PFI	2	Property for Industry Ltd	PRO	20-Feb-97	Investment - property
84	POA	1	Ports of Auckland Ltd	TRN	18-Feb-97	Port management
85	POT	1	Port of Tauranga Ltd	TRN	3-Mar-97	Port management
86	POT	2	Port of Tauranga Ltd	TRN	25-Aug-97	Port management
87	PRO	1	Progressive Enterprises Ltd	FOD	27-Mar-97	Retailing - food (supermarkets) and restaurant operator
88	PRO	2	Progressive Enterprises Ltd	FOD	1-Oct-97	Retailing - food (supermarkets) and restaurant operator
89	RCH	2	Richina Pacific Ltd	PRO	10-Mar-97	Property development, investment, construction
90	REI	2	Reid Farmers Ltd	AGS	26-Aug-97	Agricultural services - stock and station agency
91	RNS	1	Renaissance Ltd	MIS	21-Aug-97	Distribution - computers
92	ROT	2	Radio Otago Ltd	MCM	11-Jun-97	Radio station
93	RPA	1	Radio Pacific Ltd	MCM	10-Nov-97	Radio station
94	RPA	2	Radio Pacific Ltd	MCM	30-May-97	Radio station
95	SAN	1	Sanford Ltd	FOD	7-May-97	Fisheries and aquaculture
96	SAN	2	Sanford Ltd	FOD	7-Nov-97	Fisheries and aquaculture
97	SEU	1	South Eastern Utilities Ltd	INV	31-Jan-97	Investments - in Utilities such as electricity
98	SEU	2	South Eastern Utilities Ltd	INV	30-Jul-97	Investments - in Utilities such as electricity
99	SFH	1	Seafresh New Zealand Ltd	FOD	5-Jun-97	Fisheries
100	SFH	2	Seafresh New Zealand Ltd	FOD	15-Dec-97	Fisheries
101	SHP	2	Shortland Properties Ltd	PRO	12-Mar-97	Property development, Investment
102	SJL	1	Shotover Jet Ltd	TRN	16-Jun-97	Services - tourism
103	SPN	1	Southport New Zealand Ltd	TRN	24-Feb-97	Port management
104	SPN	2	Southport New Zealand Ltd	TRN	8-Sep-97	Port management
105	STL	1	St Lukes Group Ltd	PRO	14-Feb-97	Retailing - supermarkets
106	TAS	1	Tasman Agriculture Ltd	AGS	14-Feb-97	Agriculture - dairying
107	TAS	2	Tasman Agriculture Ltd	AGS	13-Aug-97	Agriculture - dairying
108	TAY	1	Taylors Group Ltd	MIS	3-Mar-97	Services - drycleaning and Property investment

109	TAY	2	Taylors Group Ltd	MIS	10-Sep-97	Services - drycleaning and Property investment
110	THL	1	Tourism Holdings Ltd	TRN	12-Mar-97	Services - tourism
111	THL	2	Tourism Holdings Ltd	TRN	12-Sep-97	Services - tourism
112	TPW	1	Trustpower Ltd	ENE	28-Nov-97	Service Utility - electricity
113	TTP	1	Trans Tasman Properties Ltd	PRO	4-Sep-97	Property Investment
114	TTP	2	Trans Tasman Properties Ltd	PRO	17-Mar-97	Property Investment
115	UNL	1	Power New Zealand Ltd	ENE	27-Nov-97	Service Utility - electricity
116	WAM	1	Waste Management NZ Ltd	MIS	21-Aug-97	Service Utility - waste disposal
117	WAM	2	Waste Management NZ Ltd	MIS	20-Feb-97	Service Utility - waste disposal
118	WHO	1	Wilson and Horton Ltd	MCM	19-Aug-97	Newspaper and Publishing
119	WHO	2	Wilson and Horton Ltd	MCM	28-Feb-97	Newspaper and Publishing
120	WKL	1	Williams and Kettle Ltd	AGS	19-Mar-97	Services - Agricultual, financial, stock and station agency
121	WKL	2	Williams and Kettle Ltd	AGS	29-Sep-97	Services - Agricultual, financial, stock and station agency
122	WRI	1	Wrightson Ltd	AGS	6-Mar-97	Services - Agricultual, financial, stock and station agency
123	WRI	2	Wrightson Ltd	AGS	11-Sep-97	Services - Agricultual, financial, stock and station agency
124	ZNZ	1	Zuellig New Zealand Ltd	MED	27-Nov-97	Manufacturing and Distribution - medical, dental, pharmaceutical supplies
125	ZNZ	2	Zuellig New Zealand Ltd	MED	9-Jun-97	Manufacturing and Distribution - medical, dental, pharmaceutical supplies

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No	COY	INTFIN	Name	Code	Date	Description
1	ADV	1	Advantage Group Ltd	MIS	9-Mar-98	Distribution - electronic equipment
2	AFF	1	AFFCO Holdings Ltd	MET	5-Jun-98	Food processing - meat
3	AFF	2	AFFCO Holdings Ltd	MET	10-Nov-98	Food processing - meat
4	AIRVA	1	Air New Zealand Ltd	TRN	17-Feb-98	Transport - air
5	AIRVA	2	Air New Zealand Ltd	TRN	3-Sep-98	Transport - air
6	ARB	1	Arthur Barnett Ltd	RET	6-Apr-98	Retailing
7	ARB	2	Arthur Barnett Ltd	RET	1-Oct-98	Retailing
8	BCH	1	Baycorp Holdings Ltd	MIS	10-Feb-98	Financial Sevices - Debt collection, credit rating
9	BCH	2	Baycorp Holdings Ltd	MIS	13-Aug-98	Financial Sevices - Debt collection, credit rating
10	BOA	2	J. Boag and Son Ltd	LIQ	4-Sep-98	Liquor Industry
11	BRY	1	Brierley Investments Ltd	INV	5-Mar-98	Investment
12	BRY	2	Brierley Investments Ltd	INV	11-Sep-98	Investment
13	CAH	1	Carter Holt Harvey Ltd	FOR	5-Nov-98	Manufacturing, distribution, fisheries - pulp, timber
14	CAH	2	Carter Holt Harvey Ltd	FOR	8-May-98	Manufacturing, distribution, fisheries - pulp, timber
15	CAV	1	Cavalier Corporation Ltd	TEX	20-Feb-98	Manufacturing - wool scouring and carpet
16	CAV	2	Cavalier Corporation Ltd	TEX	31-Aug-98	Manufacturing - wool scouring and carpet
17	CDI	2	CDL Investments New Zealand Ltd	PRO	13-Mar-98	Property developer
18	CDL	2	CDL Hotels New Zealand Ltd	INV	17-Mar-98	Investment - hotel industry
19	CEM	1	Ceramco Corporation Ltd	TEX	19-Nov-98	Manufacturing - industrial and consumer products
20	CEM	2	Ceramco Corporation Ltd	TEX	28-May-98	Manufacturing - industrial and consumer products
21	CMO	1	The Colonial Motor Company Ltd	AUT	4-Mar-98	Retailing and Distribution - motor vehicles

22	CMO	2	The Colonial Motor Company Ltd	AUT	11-Sep-98	Retailing and Distribution - motor vehicles
23	DBG	1	DB Group Ltd	LIQ	9-Jun-98	Liquor industry production and distribution, hospitality
24	DBG	2	DB Group Ltd	LIQ	9-Dec-98	Liquor industry production and distribution, hospitality
25	DON	1	Donaghys Ltd	TEX	9-Mar-98	Manufacturing - cordage, plastics, electronics
26	DON	2	Donaghys Ltd	TEX	28-Aug-98	Manufacturing - cordage, plastics, electronics
27	DPC	1	Dorchester Pacific Ltd	FIN	27-Nov-98	Financial Services
28	DPC	2	Dorchester Pacific Ltd	FIN	11-Jun-98	Financial Services
29	DTL	1	Designer Textiles NZ Ltd	TEX	24-Feb-98	Manufacturing - textiles
30	DTL	2	Designer Textiles NZ Ltd	TEX	7-Sep-98	Manufacturing - textiles
31	EBO	1	Ebos Group Ltd	MED	27-Feb-98	Retailing and Distribution - hospital and surgical supplies
32	EBO	2	Ebos Group Ltd	MED	3-Sep-98	Retailing and Distribution - hospital and surgical supplies
33	EEQ	1	Eastern Equities Corporation Ltd	AGS	8-May-98	Horticulture and Agriculture
34	EEQ	2	Eastern Equities Corporation Ltd	AGS	27-Oct-98	Horticulture and Agriculture
35	ERN	1	Ernest Adams Ltd	FOD	15-Dec-98	Food processing - cakes pastries
36	FAP	2	Fisher & Paykel Industries Ltd	ELE	8-Jun-98	Manufacturing - domestic appliances
37	FER	1	Fernz Corporation Ltd	CHM	4-Feb-98	Manufacturing - fertiliser ad chemicals (agri-)
38	FER	2	Fernz Corporation Ltd	CHM	29-Jul-98	Manufacturing - fertiliser ad chemicals (agri-)
39	FLCB	1	Fletcher Challenge Ltd Building Division	BLD	18-Feb-98	Construction
40	FLCB	2	Fletcher Challenge Ltd Building Division	BLD	12-Aug-98	Construction
41	FLCE	1	Fletcher Challenge Ltd Energy Division	ENE	18-Feb-98	Mineral Resources
42	FLCE	2	Fletcher Challenge Ltd Energy Division	ENE	12-Aug-98	Mineral Resources
43	FLCF	1	Fletcher Challenge Ltd Forest Division	FOR	18-Feb-98	Horticulture - Forestry and Logging
44	FLCF	2	Fletcher Challenge Ltd Forest Division	FOR	12-Aug-98	Horticulture - Forestry and Logging
45	FLCP	1	Fletcher Challenge Ltd Paper Division	FOR	18-Feb-98	Manufacturing - Paper
46	FOR	1	Force Corporation Ltd	MIS	11-Feb-98	Property Development, Services - cinema
47	FOR	2	Force Corporation Ltd	MIS	24-Aug-98	Property Development, Services - cinema
48	FSL	1	Fruitfed Supplies Ltd	AGS	3-Dec-98	Horticulture and Distribution - of horticulteral products
49	FSL	2	Fruitfed Supplies Ltd	AGS	4-Jun-98	Horticulture and Distribution - of horticulteral products
50	GMF	1	Goodman Fielder Ltd	FOD	6-Mar-98	Manufacturing - food processing
51	GMF	2	Goodman Fielder Ltd	FOD	4-Sep-98	Manufacturing - food processing
52	GPG	2	Guinness Peat Group Plc	INV	12-Mar-98	Manufacturing and Retailing - motor vehicles
53	GPG	2	Guinness Peat Group Plc	INV	12-Mar-98	Manufacturing and Retailing - motor vehicles
54	HBY	1	Hellaby Holdings Ltd	INV	23-Feb-98	Investment - in manufacturing and retail companies
55	HBY	2	Hellaby Holdings Ltd	INV	4-Sep-98	Investment - in manufacturing and retail companies
56	HED	1	Bay of Plenty Electricity Ltd	ENE	10-Nov-98	Service Utility - electricity
57	HED	2	Bay of Plenty Electricity Ltd	ENE	8-May-98	Service Utility - electricity
58	HLG	1	Hallenstein Glasson Holdings Ltd	RET	24-Mar-98	Retailing - clothing
59	HLG	2	Hallenstein Glasson Holdings Ltd	RET	29-Sep-98	Retailing - clothing
60	IFT	1	Infrastructure & Utilites NZ Ltd	INV	20-Oct-98	Manufacturing and Investment - electronics

61	IFT	2	Infrastructure & Utilites NZ Ltd	INV	22-Apr-98	Manufacturing and Investment - electronics
62	INL	1	Independent Newspapers Ltd	MCM	20-Feb-98	Newspaper publishers
63	INL	2	Independent Newspapers Ltd	MCM	21-Aug-98	Newspaper publishers
64	LNN	2	Lion Nathan Ltd	LIQ	28-Oct-98	Liquor industry production and distribution, hospitality
65	LPC	2	Lyttelton Port Company	TRN	10-Aug-98	Retail - books, printing
66	LWR	1	LWR Industries Ltd	TEX	25-Feb-98	Retail - books, printing
67	MBN	2	Milburn New Zealand Ltd	BLD	16-Mar-98	Manufacturing sand refining - cement, lime
68	MCH	1	Mr Chips Holdings Ltd	FOD	23-Nov-98	Food Processing
69	MCH	2	Mr Chips Holdings Ltd	FOD	5-Jun-98	Food Processing
70	MDL	2	McConnell Dowell Corporation Ltd	BLD	14-Sep-98	Construction
71	MET	2	MetLifecare Group Ltd	MIS	3-Mar-98	Services - retirement villages
72	MFT	2	Mainfreight Ltd	TRN	11-Jun-98	Transport
73	MHI	1	Michael Hill International Ltd	RET	20-Feb-98	Manufacturing and retailing - jewellery
74	MHI	2	Michael Hill International Ltd	RET	18-Aug-98	Manufacturing and retailing - jewellery
75	MMC	2	Macraes Mining Company Ltd	MIN	11-Mar-98	
76	MON	1	Corporate Investments Ltd	INV	18-Feb-98	Investment, liquor industry
77	MON	2	Corporate Investments Ltd	INV	26-Aug-98	Investment, liquor industry
78	NCH	1	Natural Gas Corporation Holdings Ltd	ENE	18-Feb-98	Mineral resources - Natural Gas
79	NCH	2	Natural Gas Corporation Holdings Ltd	ENE	19-Aug-98	Mineral resources - Natural Gas
80	NLL	1	New Zealand Light Leathers Ltd	MET	20-Aug-98	Manufacturing - Tanning industry
81	NLL	2	New Zealand Light Leathers Ltd	MET	25-Feb-98	Manufacturing - Tanning industry
82	NMH	1	National Mutual Holdings Ltd	FIN	26-May-98	Financial Serivices - Insurance
83	NOG	2	New Zealand Oil and Gas Ltd	MIN	10-Sep-98	Mineral Resources - Oil and gas exploration
84	NPX	1	Nuplex Industries Ltd	CHM	20-Feb-98	Manufacturing - resins, chemicals
85	NPX	2	Nuplex Industries Ltd	CHM	28-Aug-98	Manufacturing - resins, chemicals
86	NTH	1	Northland Port Corporation (NZ) Ltd	TRN	22-May-98	Port management
87	NTH	2	Northland Port Corporation (NZ) Ltd	TRN	18-Nov-98	Port management
88	NZR	1	The New Zealand Refining Company Ltd	ENE	27-Aug-98	Manufacturing and Refining - petrol
89	NZR	2	The New Zealand Refining Company Ltd	ENE	26-Feb-98	Manufacturing and Refining - petrol
90	OWN	1	Owens Group Ltd	TRN	11-Dec-98	Investment, transport
91	OWN	2	Owens Group Ltd	TRN	29-May-98	Investment, transport
92	PDL	1	PDL Holdings Ltd	ELE	19-Nov-98	Manufacturing - plastics, electrical goods
93	PDL	2	PDL Holdings Ltd	ELE	15-Jun-98	Manufacturing - plastics, electrical goods
94	PFI	2	Property for Industry Ltd	PRO	18-Feb-98	Investment - property
95	POA	1	Ports of Auckland Ltd	TRN	17-Feb-98	Port management
96	POT	1	Port of Tauranga Ltd	TRN	2-Mar-98	Port management
97	POT	2	Port of Tauranga Ltd	TRN	1-Sep-98	Port management
98	PRG	1	Pacific Retail Group Ltd	RET	11-Nov-98	Retailing - home appliances
99	PRG	2	Pacific Retail Group Ltd	RET	3-Jun-98	Retailing - home appliances
100	PRO	1	Progressive Enterprises Ltd	FOD	2-Apr-98	Retailing - food (supermarkets) and restaurant operator
101	PRO	2	Progressive Enterprises Ltd	FOD	15-Sep-98	Retailing - food (supermarkets) and restaurant operator
102	RCH	2	Richina Pacific Ltd	PRO	4-Mar-98	Property development, investment, construction

103	REI	2	Reid Farmers Ltd	AGS	31-Aug-98	Agricultural services - stock and station agency
104	RNS	1	Renaissance Ltd	MIS	24-Jul-98	Distribution - computers
105	ROT	2	Radio Otago Ltd	MCM	12-Jun-98	Radio station
106	RPA	2	Radio Pacific Ltd	MCM	8-Jun-98	Radio station
107	SAN	1	Sanford Ltd	FOD	6-May-98	Fisheries and aquaculture
108	SAN	2	Sanford Ltd	FOD	28-Oct-98	Fisheries and aquaculture
109	SCT	2	Scott Technology Ltd	ELE	8-Oct-98	Manufacturing - appliances
110	SEU	1	South Eastern Utilities Ltd	INV	2-Feb-98	Investments - in Utilities such as electricity
111	SEU	2	South Eastern Utilities Ltd	INV	31-Jul-98	Investments - in Utilities such as electricity
112	SHP	2	Shortland Properties Ltd	PRO	5-Mar-98	Property development, Investment
113	SKC	1	Sky City Ltd	TRN	20-Feb-98	Services - tourism, gambling
114	SPN	1	Southport New Zealand Ltd	TRN	27-Feb-98	Port management
115	SPN	2	Southport New Zealand Ltd	TRN	7-Sep-98	Port management
116	STL	2	St Lukes Group Ltd	PRO	20-Aug-98	Retailing - supermarkets
117	STU	2	Steel & Tube Holdings Ltd	ENG	30-Jul-98	Manufacturing and retailing - vehicles, large items
118	TAS	2	Tasman Agriculture Ltd	AGS	10-Aug-98	Agriculture - dairying
119	TAY	1	Taylors Group Ltd	MIS	25-Feb-98	Services - drycleaning and Property investment
120	TAY	2	Taylors Group Ltd	MIS	3-Sep-98	Services - drycleaning and Property investment
121	THL	1	Tourism Holdings Ltd	TRN	5-Mar-98	Services - tourism
122	TLT	1	Transalta New Zealand Ltd	ENE	12-Nov-98	Service Utility - electricity
123	TLT	2	Transalta New Zealand Ltd	ENE	28-May-98	Service Utility - electricity
124	TPW	1	TrustPower Ltd	ENE	27-Nov-98	Service Utility - electricity
125	TPW	2	TrustPower Ltd	ENE	29-May-98	Service Utility - electricity
126	TRH	1	Tranz Rail Holdings Ltd	TRN	30-Jan-98	Transport - railways
127	UNL	1	Power New Zealand Ltd	ENE	12-Nov-98	Service Utility - electricity
128	WAM	1	Waste Management NZ Ltd	MIS	20-Aug-98	Service Utility - waste disposal
129	WAM	2	Waste Management NZ Ltd	MIS	26-Feb-98	Service Utility - waste disposal
130	WHS	1	The Warehouse Group Ltd	RET	31-Mar-98	Retailing
131	WHS	2	The Warehouse Group Ltd	RET	25-Sep-98	Retailing
132	WKL	1	Williams and Kettle Ltd	AGS	30-Mar-98	Services - Agricultual, financial, stock and station agency
133	WKL	2	Williams and Kettle Ltd	AGS	29-Sep-98	Services - Agricultual, financial, stock and station agency
134	WRI	1	Wrightson Ltd	AGS	5-Mar-98	Services - Agricultual, financial, stock and station agency
135	WRI	2	Wrightson Ltd	AGS	3-Sep-98	Services - Agricultual, financial, stock and station agency
136	ZNZ	1	Zuellig New Zealand Ltd	MED	12-Nov-98	Manufacturing and Distribution - medical, dental, pharmaceutical supplies
137	ZNZ	2	Zuellig New Zealand Ltd	MED	4-Jun-98	Manufacturing and Distribution - medical, dental, pharmaceutical supplies

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No	COY	INTFIN	Name	Code	Date	Description
1	AIRVA	2	Air New Zealand Ltd	TRN	7-Sep-99	Transport - air
2	ARB	1	Arthur Barnett Ltd	RET	26-Mar-99	Retailing
3	ARB	2	Arthur Barnett Ltd	RET	12-Oct-99	Retailing

4	BCH	1	Baycorp Holdings Ltd	MIS	17-Feb-99	Financial Sevices - Debt collection, credit rating
5	BCH	2	Baycorp Holdings Ltd	MIS	18-Aug-99	Financial Sevices - Debt collection, credit rating
6	CAH	1	Carter Holt Harvey Ltd	FOR	4-Nov-99	Manufacturing, distribution, fisheries - pulp, timber
7	CAH	2	Carter Holt Harvey Ltd	FOR	7-May-99	Manufacturing, distribution, fisheries - pulp, timber
8	CAV	1	Cavalier Corporation Ltd	TEX	22-Feb-99	Manufacturing - wool scouring and carpet
9	CAV	2	Cavalier Corporation Ltd	TEX	30-Aug-99	Manufacturing - wool scouring and carpet
10	CDI	2	CDL Investments New Zealand Ltd	PRO	26-Feb-99	Property developer
11	CDL	2	CDL Hotels New Zealand Ltd	INV	26-Feb-99	Investment - hotel industry
12	CEM	1	Ceramco Corporation Ltd	TEX	7-Dec-99	Manufacturing - industrial and consumer products
13	CEM	2	Ceramco Corporation Ltd	TEX	27-May-99	Manufacturing - industrial and consumer products
14	CGH	2	Colonial Ltd	FIN	3-Mar-99	Financial sevices - Insurance
15	CMO	1	The Colonial Motor Company Ltd	AUT	15-Mar-99	Retailing and Distribution - motor vehicles
16	CMO	2	The Colonial Motor Company Ltd	AUT	13-Sep-99	Retailing and Distribution - motor vehicles
17	DBG	1	DB Group Ltd	LIQ	4-Jun-99	Liquor industry production and distribution, hospitality
18	DBG	2	DB Group Ltd	LIQ	1-Dec-99	Liquor industry production and distribution, hospitality
19	DMB	1	Damba Holdings Ltd	MIS	8-Sep-99	Manufacturing - furniture (also distributing)
20	DON	1	Donaghys Ltd	TEX	5-Mar-99	Manufacturing - cordage, plastics, electronics
21	DPC	2	Dorchester Pacific Ltd	FIN	15-Jun-99	Financial Services
22	DTL	1	Designer Textiles NZ Ltd	TEX	23-Feb-99	Manufacturing - textiles
23	DTL	2	Designer Textiles NZ Ltd	TEX	26-Aug-99	Manufacturing - textiles
24	EBO	1	Ebos Group Ltd	MED	24-Feb-99	Retailing and Distribution - hospital and surgical supplies
25	FAP	2	Fisher & Paykel Industries Ltd	ELE	9-Jun-99	Manufacturing - domestic appliances
26	FER	1	Fernz Corporation Ltd	CHM	3-Feb-99	Manufacturing - fertiliser ad chemicals (agri-)
27	FER	2	Fernz Corporation Ltd	CHM	28-Jul-99	Manufacturing - fertiliser ad chemicals (agri-)
28	FLCB	1	Fletcher Challenge Ltd Building Division	BLD	17-Feb-99	Construction
29	FLCB	2	Fletcher Challenge Ltd Building Division	BLD	18-Aug-99	Construction
30	FLCE	1	Fletcher Challenge Ltd Energy Division	ENE	17-Feb-99	Mineral Resources
31	FLCE	2	Fletcher Challenge Ltd Energy Division	ENE	18-Aug-99	Mineral Resources
32	FLCF	1	Fletcher Challenge Ltd Forest Division	FOR	17-Feb-99	Horticulture - Forestry and Logging
33	FLCF	2	Fletcher Challenge Ltd Forest Division	FOR	18-Aug-99	Horticulture - Forestry and Logging
34	FLCP	1	Fletcher Challenge Ltd Paper Division	FOR	17-Feb-99	Manufacturing - Paper
35	FOR	1	Force Corporation Ltd	MIS	23-Feb-99	Property Development, Services - cinema
36	FOR	2	Force Corporation Ltd	MIS	31-Aug-99	Property Development, Services - cinema
37	FSL	2	Fruitfed Supplies Ltd	AGS	26-May-99	Horticulture and Distribution - of horticulteral products
38	GMF	2	Goodman Fielder Ltd	FOD	3-Sep-99	Manufacturing - food processing
39	HBY	1	Hellaby Holdings Ltd	INV	19-Feb-99	Investment - in manufacturing and retail companies
40	HBY	2	Hellaby Holdings Ltd	INV	8-Sep-99	Investment - in manufacturing and retail companies
41	HED	2	Horizon Energy Distribution Ltd	ENE	11-Jun-99	Service Utility - electricity
42	HLG	1	Hallenstein Glasson Holdings Ltd	RET	30-Mar-99	Retailing - clothing
43	HLG	2	Hallenstein Glasson Holdings Ltd	RET	1-Oct-99	Retailing - clothing

44	IFA	2	Infratil australia Ltd	INV	30-Aug-99	Investment in Ports, Airports, Electricity Utilities
45	INL	1	Independent Newspapers Ltd	MCM	19-Feb-99	Newspaper publishers
46	INL	2	Independent Newspapers Ltd	MCM	3-Sep-99	Newspaper publishers
47	LNN	1	Lion Nathan Ltd	LIQ	30-Apr-99	Liquor industry production and distribution, hospitality
48	LPC	1	Lyttelton Port Company	TRN	8-Feb-99	Port Management
49	LPC	2	Lyttelton Port Company	TRN	9-Aug-99	Port Management
50	LWR	1	LWR Industries Ltd	TEX	3-Mar-99	Manufacturing - textiles
51	MCH	2	Mr Chips Holdings Ltd	FOD	11-Jun-99	Food Processing
52	MDL	2	McConnell Dowell Corporation Ltd	BLD	13-Sep-99	Manufacturing and Retailing - motor vehicles
53	MET	1	MetLifecare Group Ltd	MIS	13-Sep-99	Manufacturing and Retailing - motor vehicles
54	MET	2	MetLifecare Group Ltd	MIS	4-Mar-99	Services - retirement villages
55	MFT	1	Mainfreight Ltd	TRN	17-Nov-99	Transport
56	MFT	2	Mainfreight Ltd	TRN	10-Jun-99	Transport
57	MHI	1	Michael Hill International Ltd	RET	17-Feb-99	Manufacturing and retailing - jewellery
58	MHI	2	Michael Hill International Ltd	RET	20-Aug-99	Manufacturing and retailing - jewellery
59	MON	2	Montana Group (NZ) Ltd	LIQ	17-Aug-99	Investment, liquor industry
60	NCH	1	Natural Gas Corporation Holdings Ltd	ENE	18-Feb-99	Manufacturing and Investment - electronics
61	NOG	2	New Zealand Oil and Gas Ltd	MIN	14-Sep-99	Manufacturing and Investment - electronics
62	NPX	1	Nuplex Industries Ltd	CHM	26-Feb-99	Manufacturing - resins, chemicals
63	NPX	2	Nuplex Industries Ltd	CHM	20-Aug-99	Manufacturing - resins, chemicals
64	NTH	1	Northland Port Corporation (NZ) Ltd	TRN	14-May-99	Port management
65	NZR	1	The New Zealand Refining Company Ltd	ENE	26-Aug-99	Retail - books, printing
66	NZR	2	The New Zealand Refining Company Ltd	ENE	25-Feb-99	Retail - books, printing
67	OWN	1	Owens Group Ltd	TRN	26-Nov-99	Investment, transport
68	PDL	1	PDL Holdings Ltd	ELE	26-Nov-99	Manufacturing - plastics, electrical goods
69	PDL	2	PDL Holdings Ltd	ELE	14-Jun-99	Manufacturing - plastics, electrical goods
70	PFI	2	Property for Industry Ltd	PRO	23-Feb-99	Investment - property
71	POA	1	Ports of Auckland Ltd	TRN	16-Feb-99	Port management
72	POA	2	Ports of Auckland Ltd	TRN	17-Aug-99	Port management
73	POT	2	Port of Tauranga Ltd	TRN	27-Aug-99	Port management
74	PRG	1	Pacific Retail Group Ltd	RET	2-Dec-99	Retailing - home appliances
75	PRG	2	Pacific Retail Group Ltd	RET	15-Jun-99	Retailing - home appliances
76	RBD	1	Restaurant Brands New Zealand Ltd	FOD	9-Jul-99	Retailing - food, restaurants
77	RCH	2	Richina Pacific Ltd	PRO	16-Mar-99	Property development, investment, construction
78	REI	2	Reid Farmers Ltd	AGS	30-Aug-99	Agricultural services - stock and station agency
79	RPA	1	Radio Pacific Ltd	MCM	19-Nov-99	Radio station
80	RPA	2	Radio Pacific Ltd	MCM	31-May-99	Radio station
81	SAN	1	Sanford Ltd	FOD	6-May-99	Fisheries and aquaculture
82	SCT	1	Scott Technology Ltd	ELE	9-Apr-99	Manufacturing - appliances
83	SCT	2	Scott Technology Ltd	ELE	27-Oct-99	Manufacturing - appliances
84	SEU	1	South Eastern Utilities Ltd	INV	12-Feb-99	Investments - in Utilities such as electricity
85	SHP	2	Shortland Properties Ltd	PRO	10-Mar-99	Property development, Investment

86	SJL	2	Shotover Jet Ltd	TRN	17-Aug-99	Services - tourism
87	SKC	1	Sky City Ltd	TRN	22-Feb-99	Services - tourism, gambling
88	SKC	2	Sky City Ltd	TRN	12-Aug-99	Services - tourism, gambling
89	SPN	1	Southport New Zealand Ltd	TRN	22-Feb-99	Port management
90	SPN	2	Southport New Zealand Ltd	TRN	9-Sep-99	Port management
91	STU	2	Steel & Tube Holdings Ltd	ENG	28-Jul-99	Manufacturing and retailing - vehicles, large items
92	TAS	2	Tasman Agriculture Ltd	AGS	5-Aug-99	Agriculture - dairying
93	TAY	1	Taylors Group Ltd	MIS	15-Feb-99	Services - drycleaning and Property investment
94	TAY	2	Taylors Group Ltd	MIS	1-Sep-99	Services - drycleaning and Property investment
95	TLS	1	Telstra Corporation Ltd	MCM	11-Mar-99	Service Utility - telecommunications
96	TLT	2	Transalta New Zealand Ltd	ENE	27-May-99	Service Utility - electricity
97	TPW	1	TrustPower Ltd	ENE	26-Nov-99	Service Utility - electricity
98	TPW	2	TrustPower Ltd	ENE	14-Jun-99	Service Utility - electricity
99	TRH	1	Tranz Rail Holdings Ltd	TRN	5-Feb-99	Transport - railways
100	TTP	2	Trans Tasman Properties Ltd	PRO	24-Feb-99	Property Investment
101	UNL	2	UnitedNetworks Ltd	ENE	14-Jun-99	Service Utility - electricity
102	WAM	2	Waste Management NZ Ltd	MIS	25-Feb-99	Service Utility - waste disposal
103	WKL	1	Williams and Kettle Ltd	AGS	30-Mar-99	Services - Agricultual, financial, stock and station agency
104	WKL	2	Williams and Kettle Ltd	AGS	17-Sep-99	Services - Agricultual, financial, stock and station agency
105	WRI	2	Wrightson Ltd	AGS	31-Aug-99	Services - Agricultual, financial, stock and station agency

Appendix C Company/event Data Table

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
1	ADV	End	31-Aug-95	4.6	0.1530	3.8	0.1067	0.2105	0.4335	DI-EI	97
2	ADV	Mid	4-Mar-96	3	0.0663	3	0.0656	0.0000	0.0107	DNC-EI	94
3	ADV	End	30-Aug-96	3	11.8600	4.6	15.3000	-0.3478	-0.2248	DD-ED	91
4	ADV	Mid	14-Feb-97	3.5	6.4600	3	6.0500	0.1667	0.0678	DI-EI	85
5	ADV	End	15-Sep-97	0	5.6700	3	11.8600	-1.0000	-0.5219	DD-ED	88
6	ADV	Mid	9-Mar-98	0	-16.8900	3.5	6.4600	-1.0000	-3.6146	DD-ED	69
7	AFF	Mid	31-May-96	2.5	5.4800	0	4.9100	∞	0.1161	DI-EI	95
8	AFF	End	14-Nov-96	2.5	15.7700	2.5	17.2100	0.0000	-0.0837	DNC-ED	96
9	AFF	Mid	29-May-97	2.5	2.7600	2.5	5.4800	0.0000	-0.4964	DNC-ED	96
10	AFF	End	14-Nov-97	1.25	4.5600	2.5	15.7700	-0.5000	-0.7108	DD-ED	99
11	AFF	Mid	5-Jun-98	0	-1.2700	2.5	2.7600	-1.0000	-1.4601	DD-ED	99
12	AFF	End	10-Nov-98	0	-1.2200	1.25	4.5600	-1.0000	-1.2675	DD-ED	99
13	AIRVA	End	1-Oct-91	0	0.1926	6.5	0.3606	-1.0000	-0.4659	DD-ED	100
14	AIRVA	End	21-Sep-92	6	0.2741	0	0.0567	∞	3.8332	DI-EI	100
15	AIRVA	Mid	4-Mar-93	4	0.1451	4	0.2003	0.0000	-0.2755	DNC-ED	100
16	AIRVA	End	8-Sep-93	6	0.3209	6	0.2741	0.0000	0.1710	DNC-EI	99
17	AIRVA	End	7-Sep-94	8	0.4299	6	0.3209	0.3333	0.3396	DI-EI	100
18	AIRVA	Mid	17-Feb-95	8	0.3167	6	0.2026	0.3333	0.5630	DI-EI	100
19	AIRVA	End	5-Sep-95	12	0.5866	8	0.4299	0.5000	0.3645	DI-EI	99
20	AIRVA	Mid	23-Feb-96	8	0.3047	8	0.3167	0.0000	-0.0379	DNC-ED	100
21	AIRVA	End	2-Sep-96	12	50.7900	12	58.6600	0.0000	-0.1342	DNC-ED	100
22	AIRVA	Mid	19-Feb-97	8	13.5400	8	30.4700	0.0000	-0.5556	DNC-ED	100
23	AIRVA	End	2-Sep-97	12	26.5000	12	50.7900	0.0000	-0.4782	DNC-ED	100
24	AIRVA	Mid	17-Feb-98	8	14.4700	8	13.5400	0.0000	0.0687	DNC-EI	100
25	AIRVA	End	3-Sep-98	8	25.5500	12	26.5000	-0.3333	-0.0358	DD-ED	100
26	AIRVA	End	7-Sep-99	9	37.8200	8	24.8600	0.1250	0.5213	DI-EI	100
27	APF	End	19-Nov-91	4	0.1551	3	0.1089	0.3333	0.4241	DI-EI	41
28	APF	End	27-Nov-92	5	0.1403	4	0.0066	0.2500	20.1555	DI-EI	99
29	APF	End	1-Dec-93	5	0.1920	5	0.1403	0.0000	0.3685	DNC-EI	98
30	APF	End	5-Dec-94	0	-0.0167	5	-0.1423	-1.0000	0.8825	DD-EI	79
31	AQL	End	19-Jun-92	2	0.0801	2	0.0475	0.0000	0.6845	DNC-EI	99
32	AQL	End	24-Jun-93	0	-0.1175	2	0.0801	-1.0000	-2.4673	DD-ED	97
33	ARB	End	29-Sep-95	7	0.3460	0	0.3445	∞	0.0042	DI-EI	41
34	ARB	Mid	25-Mar-96	3	0.1484	0	0.1693	∞	-0.1235	DI-ED	46
35	ARB	End	7-Oct-96	6	16.3500	7	22.0000	-0.1429	-0.2568	DD-ED	34
36	ARB	Mid	20-Mar-97	3	2.2800	3	9.4300	0.0000	-0.7582	DNC-ED	50
37	ARB	End	8-Oct-97	6	5.6100	6	16.3500	0.0000	-0.6569	DNC-ED	40
38	ARB	Mid	6-Apr-98	3	0.6600	3	2.2800	0.0000	-0.7105	DNC-ED	45
39	ARB	End	1-Oct-98	0	-14.3200	6	5.6100	-1.0000	-3.5526	DD-ED	42
40	ARB	Mid	26-Mar-99	5	2.1400	3	0.6600	0.6667	2.2424	DI-EI	22
41	ARB	End	12-Oct-99	3	2.8700	0	-14.3200	∞	1.2004	DI-EI	38
42	ASN	Mid	22-Dec-93	2	-0.0059	0	-0.0290	∞	0.7958	DI-EI	49
43	ASN	End	11-Jul-94	2	0.0304	0	0.1448	∞	-0.7901	DI-ED	23
44	ASN	End	12-Jun-95	4	0.0584	2	0.0304	1.0000	0.9195	DI-EI	17
45	ASN	Mid	11-Dec-95	3	0.0283	0	0.0281	∞	0.0067	DI-EI	33
46	ASN	End	5-Jun-96	4	3.1000	4	5.8400	0.0000	-0.4692	DNC-ED	28
47	ASN	End	5-Jun-97	0	5.1700	4	3.1000	-1.0000	0.6677	DD-EI	29
48	BCH	Mid	22-Feb-95	4	0.0470	0	-0.1813	∞	1.2594	DI-EI	87
49	BCH	End	9-Aug-95	7.5	0.1202	0	-0.1807	∞	1.6653	DI-EI	87

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
50	BCH	Mid	20-Feb-96	7	0.0789	4	0.0470	0.7500	0.6770	DI-EI	96
51	BCH	Mid	20-Feb-97	10	10.4700	7	7.8900	0.4286	0.3270	DI-EI	98
52	BCH	End	12-Aug-97	12	23.5300	10	18.3500	0.2000	0.2823	DI-EI	99
53	BCH	Mid	10-Feb-98	12	12.2800	10	10.4700	0.2000	0.1729	DI-EI	100
54	BCH	End	13-Aug-98	15	29.0000	12	23.5300	0.2500	0.2325	DI-EI	98
55	BCH	Mid	17-Feb-99	14	14.7400	12	12.2800	0.1667	0.2003	DI-EI	99
56	BCH	End	18-Aug-99	9	33.5500	15	29.0000	-0.4000	0.1569	DD-EI	100
57	BNZ	Mid	15-Oct-90	3.38	0.0764	4.13	0.0851	-0.1816	-0.1024	DD-ED	58
58	BNZ	End	16-Apr-91	4.13	0.1471	4.13	0.1625	0.0000	-0.0947	DNC-ED	41
59	BNZ	Mid	15-Oct-91	3.38	0.0605	3.38	0.0764	0.0000	-0.2082	DNC-ED	72
60	BNZ	End	21-Apr-92	4.13	0.1288	4.13	0.1471	0.0000	-0.1241	DNC-ED	93
61	BNZ	Mid	16-Oct-92	3.38	0.0504	3.38	0.0605	0.0000	-0.1675	DNC-ED	95
62	BNZ	Mid	22-Apr-93	4.13	0.1012	4.13	0.1288	0.0000	-0.2145	DNC-ED	97
63	BNZ	End	22-Oct-93	3.75	0.1153	4.13	0.1288	-0.0920	-0.1046	DD-ED	96
64	BNZ	Mid	20-Apr-94	3.38	0.0534	4.12	0.0243	-0.1796	1.1977	DD-EI	99
65	BNZ	End	19-Oct-94	4.75	0.1085	3.75	0.0666	0.2667	0.6290	DI-EI	90
66	BNZ	Mid	19-Apr-95	4.75	0.0632	3.75	0.0534	0.2667	0.1829	DI-EI	78
67	BNZ	End	18-Oct-95	6.25	0.1442	4.75	0.1085	0.3158	0.3289	DI-EI	82
68	BOA	Mid	7-Mar-97	1	4.4100	0	-0.4000	∞	12.0250	DI-EI	74
69	BOA	End	17-Sep-97	2.6	6.2900	0	-0.0600	∞	105.8333	DI-EI	79
70	BOA	End	4-Sep-98	0.5	-0.7700	2.6	6.2900	-0.8077	-1.1224	DD-ED	69
71	BRY	End	27-Sep-90	6	20.3950	5.5	21.1506	0.0909	-0.0357	DI-ED	100
72	BRY	End	26-Sep-91	4	0.0835	6	0.2040	-0.3333	-0.5906	DD-ED	100
73	BRY	Mid	3-Mar-94	4	0.0554	4	0.0444	0.0000	0.2459	DNC-EI	100
74	BRY	End	8-Sep-94	5	0.1642	5	0.1070	0.0000	0.5349	DNC-EI	100
75	BRY	Mid	2-Mar-95	4	0.0539	4	0.0554	0.0000	-0.0267	DNC-ED	100
76	BRY	End	8-Sep-95	5	0.1617	5	0.1642	0.0000	-0.0155	DNC-ED	99
77	BRY	Mid	7-Mar-96	4	0.0637	4	0.0539	0.0000	0.1814	DNC-EI	100
78	BRY	End	5-Sep-96	5	10.3800	5	14.5800	0.0000	-0.2881	DNC-ED	100
79	BRY	Mid	6-Mar-97	4	3.8800	4	5.6900	0.0000	-0.3181	DNC-ED	100
80	BRY	End	4-Sep-97	5	10.4000	5	10.3800	0.0000	0.0019	DNC-EI	100
81	BRY	Mid	5-Mar-98	4	4.0300	4	3.8800	0.0000	0.0387	DNC-EI	100
82	BRY	End	11-Sep-98	0	9.6000	5	10.4000	-1.0000	-0.0769	DD-ED	100
83	BWY	End	13-Sep-91	4	0.0896	3	0.2185	0.3333	-0.5901	DI-ED	43
84	BWY	End	16-Sep-92	5	0.1425	4	0.0896	0.2500	0.5913	DI-EI	84
85	BWY	Mid	25-Feb-93	2	0.0742	2	0.0801	0.0000	-0.0731	DNC-ED	85
86	BWY	End	15-Sep-93	6	0.1528	5	0.1425	0.2000	0.0722	DI-EI	91
87	BWY	Mid	2-Mar-94	3	0.1020	2	0.0790	0.5000	0.2919	DI-EI	88
88	BWY	Mid	28-Feb-95	3	0.0738	3	0.1020	0.0000	-0.2770	DNC-ED	62
89	BWY	End	14-Sep-95	4	0.0827	6	0.1773	-0.3333	-0.5333	DD-ED	76
90	BWY	Mid	1-Mar-96	0	-0.0312	3	0.0738	-1.0000	-1.4228	DD-ED	70
91	BWY	End	3-Sep-96	3	5.8800	4	8.2700	-0.2500	-0.2890	DD-ED	77
92	BWY	End	12-Sep-97	0	0.0200	3	5.8800	-1.0000	-0.9966	DD-ED	74
93	CAH	End	12-Jun-92	6	0.1428	6	0.1766	0.0000	-0.1912	DNC-ED	100
94	CAH	End	28-May-93	4	0.1526	6	0.1428	-0.3333	0.0686	DD-EI	100
95	CAH	Mid	10-Nov-93	4	0.1036	4	0.0829	0.0000	0.2497	DNC-EI	100
96	CAH	End	25-May-94	4	0.1923	4	0.1523	0.0000	0.2622	DNC-EI	100
97	CAH	End	8-May-96	5	0.2623	5	0.2579	0.0000	0.0171	DNC-EI	100
98	CAH	Mid	6-Nov-96	5	6.7700	5	15.6900	0.0000	-0.5685	DNC-ED	100
99	CAH	End	13-May-97	5	13.6500	5	26.2900	0.0000	-0.4808	DNC-ED	100
100	CAH	Mid	6-Nov-97	5	6.0700	5	6.7700	0.0000	-0.1034	DNC-ED	100
101	CAH	End	8-May-98	5	8.2100	5	13.6500	0.0000	-0.3985	DNC-ED	100

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
102	CAH	Mid	5-Nov-98	3	1.4500	5	6.0700	-0.4000	-0.7611	DD-ED	100
103	CAH	End	7-May-99	3	3.7000	5	8.2100	-0.4000	-0.5493	DD-ED	100
104	CAH	Mid	4-Nov-99	3	3.6300	3	1.4500	0.0000	1.5034	DNC-EI	100
105	CAV	End	29-Aug-90	7	0.2561	7	0.2766	0.0000	-0.0740	DNC-ED	81
106	CAV	Mid	25-Feb-91	5.5	0.1309	5.5	0.1314	0.0000	-0.0040	DNC-ED	58
107	CAV	End	29-Aug-91	7.5	0.2511	7	0.2561	0.0714	-0.0198	DI-ED	89
108	CAV	End	20-Aug-92	12	0.3227	7.5	0.2511	0.6000	0.2852	DI-EI	99
109	CAV	Mid	11-Feb-93	7	0.1357	7	0.1280	0.0000	0.0607	DNC-EI	99
110	CAV	End	26-Aug-93	13	0.3363	12	0.3227	0.0833	0.0424	DI-EI	98
111	CAV	End	25-Aug-94	12	0.3075	13	0.3363	-0.0769	-0.0856	DD-ED	99
112	CAV	Mid	16-Feb-95	8	0.1819	8	0.1792	0.0000	0.0150	DNC-EI	95
113	CAV	End	1-Sep-95	12	0.3446	12	0.3075	0.0000	0.1204	DNC-EI	99
114	CAV	Mid	16-Feb-96	8	0.1346	8	0.1819	0.0000	-0.2599	DNC-ED	100
115	CAV	End	30-Aug-96	12	28.5300	12	34.4600	0.0000	-0.1721	DNC-ED	99
116	CAV	Mid	14-Feb-97	6	11.1200	8	13.4600	-0.2500	-0.1738	DD-ED	99
117	CAV	End	29-Aug-97	8	22.4200	12	28.5300	-0.3333	-0.2142	DD-ED	100
118	CAV	Mid	20-Feb-98	7	13.4800	6	11.1200	0.1667	0.2122	DI-EI	97
119	CAV	End	31-Aug-98	12	27.9300	8	22.4200	0.5000	0.2458	DI-EI	100
120	CAV	Mid	22-Feb-99	8	14.4600	7	13.4800	0.1429	0.0727	DI-EI	100
121	CAV	End	30-Aug-99	12	29.4300	12	27.9300	0.0000	0.0537	DNC-EI	100
122	CDI	End	3-Mar-97	3	5.7900	0	4.2400	∞	0.3656	DI-EI	97
123	CDI	End	13-Mar-98	2	5.0600	3	5.7900	-0.3333	-0.1261	DD-ED	93
124	CDI	End	26-Feb-99	2	2.2600	2	5.0600	0.0000	-0.5534	DNC-ED	89
125	CDL	End	3-Mar-97	1	3.7000	0	6.0100	∞	-0.3844	DI-ED	92
126	CDL	End	17-Mar-98	0.75	3.2100	1	3.7000	-0.2500	-0.1324	DD-ED	90
127	CDL	End	26-Feb-99	0.75	1.9900	0.75	3.2100	0.0000	-0.3801	DNC-ED	94
128	CED	End	13-Dec-95	9	0.2303	7	0.1199	0.2857	0.9213	DI-EI	69
129	CED	Mid	17-Jun-96	0	-9.0700	5	6.6900	-1.0000	-2.3558	DD-ED	94
130	CED	End	16-Dec-96	0	-10.5400	9	23.4100	-1.0000	-1.4502	DD-ED	86
131	CEM	Mid	11-Dec-90	4	0.0478	4	0.1037	0.0000	-0.5396	DNC-ED	89
132	CEM	End	14-Jun-91	4	0.1488	4	0.1080	0.0000	0.3781	DNC-EI	94
133	CEM	Mid	21-Nov-91	5.5	0.0740	4	0.0478	0.3750	0.5504	DI-EI	100
134	CEM	End	29-May-92	7.5	0.1728	4	0.1488	0.8750	0.1607	DI-EI	100
135	CEM	End	21-May-93	28	0.3988	7.5	0.1728	2.7333	1.3081	DI-EI	100
136	CEM	Mid	11-Nov-93	12	0.1651	12	0.0783	0.0000	1.1097	DNC-EI	100
137	CEM	End	25-May-94	28	0.3154	28	0.3988	0.0000	-0.2090	DNC-ED	100
138	CEM	Mid	11-Nov-94	6	0.0857	12	0.1651	-0.5000	-0.4810	DD-ED	99
139	CEM	End	1-Jun-95	7.5	0.1802	28	0.3154	-0.7321	-0.4286	DD-ED	98
140	CEM	Mid	9-Nov-95	10	0.0081	6	0.0857	0.6667	-0.9059	DI-ED	100
141	CEM	End	30-May-96	7.5	0.0000	7.5	18.0200	0.0000	-1.0000	DNC-ED	98
142	CEM	Mid	20-Nov-96	0	-1.6100	10	1.0700	-1.0000	-2.5047	DD-ED	99
143	CEM	End	29-May-97	0	6.3300	7.5	9.9500	-1.0000	-0.3638	DD-ED	97
144	CEM	Mid	20-Nov-97	2.5	4.8000	0	-1.6100	∞	3.9814	DI-EI	100
145	CEM	End	28-May-98	2.5	9.7700	0	6.3300	∞	0.5434	DI-EI	96
146	CEM	Mid	19-Nov-98	0	1.2000	2.5	4.8000	-1.0000	-0.7500	DD-ED	87
147	CEM	End	27-May-99	5	7.1900	2.5	9.7700	1.0000	-0.2641	DI-ED	97
148	CEM	Mid	7-Dec-99	5	4.5400	0	1.2000	∞	2.7833	DI-EI	94
149	CGH	End	3-Mar-99	8	37.6700	7	39.0300	0.1429	-0.0348	DI-ED	100
150	CMO	Mid	1-Apr-92	3.25	0.0383	3.25	0.0229	0.0000	0.6757	DNC-EI	29
151	CMO	End	28-Sep-92	4.25	0.1188	4.25	0.0594	0.0000	1.0000	DNC-EI	46
152	CMO	Mid	30-Mar-93	3.25	0.0778	3.25	0.0383	0.0000	1.0306	DNC-EI	46
153	CMO	End	24-Sep-93	5.75	0.1866	4.25	0.1188	0.3529	0.5698	DI-EI	80

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
154	CMO	Mid	30-Mar-94	4	0.1189	3.25	0.0778	0.2308	0.5272	DI-EI	90
155	CMO	End	23-Sep-94	6	0.2494	5.75	0.1866	0.0435	0.3368	DI-EI	69
156	CMO	Mid	16-Mar-95	4.25	0.1114	4	0.1189	0.0625	-0.0627	DI-ED	50
157	CMO	Mid	29-Feb-96	15	0.1704	4.25	0.1114	2.5294	0.5290	DI-EI	65
158	CMO	End	13-Sep-96	15	31.6700	8.75	24.5900	0.7143	0.2879	DI-EI	39
159	CMO	Mid	4-Mar-98	8	8.1700	8.5	11.5700	-0.0588	-0.2939	DD-ED	36
160	CMO	End	11-Sep-98	5.5	15.2300	7.5	21.1500	-0.2667	-0.2799	DD-ED	35
161	CMO	Mid	15-Mar-99	8	6.4100	8	8.1700	0.0000	-0.2154	DNC-ED	66
162	CMO	End	13-Sep-99	7.5	18.5500	5.5	15.2300	0.3636	0.2180	DI-EI	73
163	DBG	End	29-Aug-90	6	0.1819	9	0.3014	-0.3333	-0.3965	DD-ED	99
164	DBG	Mid	28-Feb-91	5	0.1051	5	0.1130	0.0000	-0.0698	DNC-ED	96
165	DBG	End	30-Aug-91	6	0.1082	6	0.1819	0.0000	-0.4053	DNC-ED	99
166	DBG	Mid	4-Mar-92	0	0.0360	5	0.1051	-1.0000	-0.6571	DD-ED	100
167	DBG	End	23-Sep-92	0	0.1011	6	0.1082	-1.0000	-0.0657	DD-ED	100
168	DBG	End	14-Dec-95	2	0.0564	0	-0.3030	∞	1.1860	DI-EI	100
169	DBG	End	11-Dec-96	2	7.9500	2	5.7000	0.0000	0.3947	DNC-EI	100
170	DBG	Mid	11-Jun-97	8	0.0422	2	0.0519	3.0000	-0.1865	DI-ED	100
171	DBG	End	10-Dec-97	2	27.1800	2	7.9500	0.0000	2.4189	DNC-EI	99
172	DBG	Mid	9-Jun-98	8	14.4800	8	4.5000	0.0000	2.2178	DNC-EI	99
173	DBG	End	9-Dec-98	8	24.4200	2	27.1800	3.0000	-0.1015	DI-ED	98
174	DBG	Mid	4-Jun-99	8	13.6700	8	14.4800	0.0000	-0.0559	DNC-ED	100
175	DBG	End	1-Dec-99	8	29.2300	8	24.4200	0.0000	0.1970	DNC-EI	100
176	DCP	End	13-Sep-96	1	7.1100	0	-3.2100	∞	3.2150	DI-EI	100
177	DCP	End	26-Aug-97	1.5	6.6000	1	7.1100	0.5000	-0.0717	DI-ED	99
178	DMB	End	18-Jun-91	2	0.0441	5	0.1171	-0.6000	-0.6232	DD-ED	7
179	DMB	End	25-Jun-92	0	0.0062	2	0.0441	-1.0000	-0.8605	DD-ED	10
180	DMB	Mid	4-Dec-92	2	0.0614	2	0.0333	0.0000	0.8423	DNC-EI	6
181	DMB	End	19-May-93	3	0.0632	0	0.0062	∞	9.2708	DI-EI	14
182	DMB	Mid	22-Dec-93	0	0.0421	2	0.0676	-1.0000	-0.3776	DD-ED	38
183	DMB	End	29-Jun-94	0	-0.0213	3	0.0633	-1.0000	-1.3360	DD-ED	21
184	DMB	End	15-Mar-95	2	0.0574	0	-0.0213	∞	3.6988	DI-EI	16
185	DMB	End	4-Mar-96	4	0.0862	2	0.0574	1.0000	0.5000	DI-EI	10
186	DMB	Mid	8-Sep-99	2.5	-0.4100	0	2.1600	∞	-1.1898	DI-ED	35
187	DON	End	7-Sep-90	7	0.1712	7	0.1370	0.0000	0.2494	DNC-EI	62
188	DON	Mid	4-Mar-91	4.5	0.0789	4.5	0.0703	0.0000	0.1224	DNC-EI	59
189	DON	End	6-Sep-91	7	0.1650	7	0.1712	0.0000	-0.0363	DNC-ED	87
190	DON	Mid	9-Mar-92	4.5	0.0755	4.5	0.0789	0.0000	-0.0436	DNC-ED	93
191	DON	End	4-Sep-92	7	0.1741	7	0.1650	0.0000	0.0549	DNC-EI	98
192	DON	Mid	5-Mar-93	4.5	0.0916	4.5	0.0755	0.0000	0.2140	DNC-EI	99
193	DON	End	3-Sep-93	7	0.1861	7	0.1741	0.0000	0.0692	DNC-EI	95
194	DON	Mid	4-Mar-94	6	0.1101	4.5	0.0916	0.3333	0.2019	DI-EI	97
195	DON	End	2-Sep-94	7	0.2393	7	0.1861	0.0000	0.2860	DNC-EI	95
196	DON	Mid	3-Mar-95	6	0.1423	6	0.1101	0.0000	0.2928	DNC-EI	90
197	DON	End	1-Sep-95	7	0.6934	7	0.2393	0.0000	1.8971	DNC-EI	93
198	DON	Mid	8-Mar-96	7	0.1104	6	0.1423	0.1667	-0.2247	DI-ED	98
199	DON	Mid	7-Mar-97	7	9.8800	7	15.4500	0.0000	-0.3605	DNC-ED	92
200	DON	End	29-Aug-97	8	13.6000	8	22.0500	0.0000	-0.3832	DNC-ED	93
201	DON	Mid	9-Mar-98	4	5.6800	7	9.8800	-0.4286	-0.4251	DD-ED	97
202	DON	End	28-Aug-98	3	1.0000	8	13.6000	-0.6250	-0.9265	DD-ED	99
203	DON	Mid	5-Mar-99	5	9.9200	4	5.6800	0.2500	0.7465	DI-EI	94
204	DPC	End	11-Jun-98	0.4	1.3900	0	0.1800	∞	6.7222	DI-EI	67
205	DPC	Mid	27-Nov-98	2	4.5700	0.4	0.5900	4.0000	6.7458	DI-EI	85

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
206	DPC	End	15-Jun-99	2.5	11.5100	0.8	1.3900	2.1250	7.2806	DI-EI	71
207	DTL	Mid	21-Nov-95	3	0.0517	3.75	0.1062	-0.2000	-0.5137	DD-ED	86
208	DTL	End	17-May-96	5	13.1600	5	21.5000	0.0000	-0.3879	DNC-ED	75
209	DTL	Mid	25-Feb-97	2	7.2400	3	5.1500	-0.3333	0.4058	DD-EI	69
210	DTL	End	26-Aug-97	3	12.2800	5	13.1600	-0.4000	-0.0669	DD-ED	83
211	DTL	Mid	24-Feb-98	2	4.4800	2	7.2400	0.0000	-0.3812	DNC-ED	66
212	DTL	End	7-Sep-98	1	4.0100	3	12.2800	-0.6667	-0.6735	DD-ED	64
213	DTL	Mid	23-Feb-99	1	2.8200	2	4.4800	-0.5000	-0.3705	DD-ED	58
214	DTL	End	26-Aug-99	2	5.2400	1	4.0100	1.0000	0.3067	DI-EI	86
215	EBO	End	1-Oct-92	5	0.1414	0	0.0989	∞	0.4292	DI-EI	27
216	EBO	Mid	12-Mar-93	3	0.1170	0	0.0506	∞	1.3125	DI-EI	48
217	EBO	End	1-Sep-93	10	0.2900	5	0.1414	1.0000	1.0511	DI-EI	43
218	EBO	Mid	16-Mar-94	15	0.2936	3	0.1170	4.0000	1.5097	DI-EI	37
219	EBO	Mid	22-Feb-95	6	0.3993	15	0.2936	-0.6000	0.3600	DD-EI	44
220	EBO	End	23-Aug-95	14	0.3020	30	0.6978	-0.5333	-0.5672	DD-ED	68
221	EBO	Mid	21-Feb-96	8.5	0.1807	6	0.3993	0.4167	-0.5475	DI-ED	45
222	EBO	End	20-Aug-96	18	38.5800	14	30.2000	0.2857	0.2775	DI-EI	53
223	EBO	Mid	24-Feb-97	9	18.3500	8.5	18.0700	0.0588	0.0155	DI-EI	81
224	EBO	End	12-Sep-97	18	40.0700	18	38.5800	0.0000	0.0386	DNC-EI	76
225	EBO	Mid	27-Feb-98	9	19.3900	9	18.3500	0.0000	0.0567	DNC-EI	59
226	EBO	End	3-Sep-98	18	37.9100	18	40.0700	0.0000	-0.0539	DNC-ED	70
227	EBO	Mid	24-Feb-99	9	19.5500	9	19.3900	0.0000	0.0083	DNC-EI	63
228	EEQ	End	30-Oct-91	3	0.1008	0	0.0280	∞	2.5974	DI-EI	46
229	EEQ	Mid	6-May-92	3	0.0205	2	0.0154	0.5000	0.3307	DI-EI	90
230	EEQ	Mid	26-Apr-93	0	-0.0148	3	0.0205	-1.0000	-1.7230	DD-ED	99
231	EEQ	End	29-Oct-93	4	0.0705	5	0.1684	-0.2000	-0.5816	DD-ED	98
232	EEQ	Mid	6-May-94	2.5	0.0069	0	-0.0148	∞	1.4640	DI-EI	100
233	EEQ	End	2-Nov-94	4	0.1215	4	0.0705	0.0000	0.7247	DNC-EI	89
234	EEQ	Mid	3-May-95	2.5	0.0077	2.5	0.0069	0.0000	0.1169	DNC-EI	86
235	EEQ	End	1-Nov-95	5	0.1085	4	0.1215	0.2500	-0.1068	DI-ED	90
236	EEQ	Mid	13-May-96	2.5	-1.8900	2.5	0.7700	0.0000	-3.4545	DNC-ED	93
237	EEQ	End	25-Oct-96	4	9.2300	5	10.8500	-0.2000	-0.1493	DD-ED	83
238	EEQ	Mid	23-Apr-97	2.5	-0.1200	2.5	-1.8900	0.0000	0.9365	DNC-EI	95
239	EEQ	End	23-Oct-97	4	8.6800	4	9.2300	0.0000	-0.0596	DNC-ED	87
240	EEQ	Mid	8-May-98	1.5	-3.0600	2.5	-0.1200	-0.4000	-24.5000	DD-ED	68
241	EEQ	End	27-Oct-98	1.5	-1.8400	4	8.6800	-0.6250	-1.2120	DD-ED	71
242	ENC	End	17-May-94	2.13	0.0784	6.3	0.1860	-0.6619	-0.5786	DD-ED	100
243	ENC	Mid	8-Nov-94	6	0.1439	5.6	0.1026	0.0714	0.4021	DI-EI	94
244	ENC	End	9-May-95	5.5	0.2234	2.13	0.0784	1.5822	1.8495	DI-EI	94
245	ENC	Mid	15-Nov-95	7	0.1195	6	0.1439	0.1667	-0.1696	DI-ED	96
246	ENC	End	8-May-96	7.5	0.1914	5.5	0.2234	0.3636	-0.1429	DI-ED	98
247	ENC	Mid	13-Nov-96	10.5	14.8700	7	11.8200	0.5000	0.2580	DI-EI	98
248	ENC	End	16-May-97	6	21.8300	7.5	19.1600	-0.2000	0.1394	DD-EI	93
249	ENC	Mid	4-Nov-97	11	15.8800	10.5	14.8700	0.0476	0.0679	DI-EI	97
250	ERN	Mid	11-Nov-91	3	0.0801	3	0.1006	0.0000	-0.2034	DNC-ED	74
251	ERN	End	29-May-92	4	0.1549	3.5	0.1529	0.1429	0.0126	DI-EI	74
252	ERN	End	31-May-93	5	0.1505	4	0.1549	0.2500	-0.0279	DI-ED	75
253	ERN	Mid	12-Nov-93	5	0.0984	4	0.0872	0.2500	0.1285	DI-EI	90
254	ERN	End	16-Jun-94	5	0.1672	5	0.1505	0.0000	0.1107	DNC-EI	96
255	ERN	End	30-May-95	5	0.1216	5	0.1672	0.0000	-0.2724	DNC-ED	67
256	ERN	Mid	10-Nov-95	5	0.0564	5	0.0654	0.0000	-0.1380	DNC-ED	75
257	ERN	End	12-Jun-96	5	9.5000	5	12.1600	0.0000	-0.2188	DNC-ED	74

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
258	ERN	Mid	13-Dec-96	2	4.6500	5	6.8100	-0.6000	-0.3172	DD-ED	74
259	ERN	End	5-Jun-97	0	6.4700	5	9.5000	-1.0000	-0.3189	DD-ED	70
260	ERN	Mid	12-Dec-97	5	4.8300	2	4.6500	1.5000	0.0387	DI-EI	84
261	ERN	Mid	15-Dec-98	0	1.0600	5	4.8300	-1.0000	-0.7805	DD-ED	38
262	FAP	Mid	2-Nov-90	8	0.0570	8	0.1187	0.0000	-0.5199	DNC-ED	97
263	FAP	End	7-Jun-91	2	0.0439	8	0.2397	-0.7500	-0.8168	DD-ED	96
264	FAP	End	12-Jun-92	6	0.0813	2	0.0439	2.0000	0.8514	DI-EI	100
265	FAP	End	4-Jun-93	10	0.1879	6	0.0813	0.6667	1.3114	DI-EI	99
266	FAP	End	2-Jun-94	8	0.2572	10	0.1879	-0.2000	0.3691	DD-EI	99
267	FAP	End	29-May-95	9	0.3903	8	0.2572	0.1250	0.5174	DI-EI	100
268	FAP	Mid	3-Nov-95	9	0.1786	9	0.1837	0.0000	-0.0277	DNC-ED	99
269	FAP	End	7-Jun-96	9	0.0000	9	39.7200	0.0000	-1.0000	DNC-ED	100
270	FAP	End	6-Jun-97	9	32.8500	9	35.6400	0.0000	-0.0783	DNC-ED	100
271	FAP	End	8-Jun-98	9	31.0100	9	32.8500	0.0000	-0.0560	DNC-ED	99
272	FAP	End	9-Jun-99	9	29.8600	9	31.0100	0.0000	-0.0371	DNC-ED	100
273	FER	End	26-Jul-90	12	0.4941	14	0.3934	-0.1429	0.2559	DD-EI	85
274	FER	Mid	15-Feb-91	10	0.1959	10	0.2745	0.0000	-0.2864	DNC-ED	61
275	FER	Mid	17-Feb-92	10	0.2289	10	0.1959	0.0000	0.1690	DNC-EI	86
276	FER	Mid	12-Feb-93	11	0.2909	10	0.2289	0.1000	0.2707	DI-EI	97
277	FER	End	22-Jul-93	14	0.5263	13	0.4836	0.0769	0.0883	DI-EI	97
278	FER	End	22-Jul-94	8	0.2717	14	0.5263	-0.4286	-0.4838	DD-ED	100
279	FER	Mid	16-Feb-95	7	0.1383	6	0.3333	0.1667	-0.5849	DI-ED	99
280	FER	End	28-Jul-95	8	0.2852	8	0.2717	0.0000	0.0495	DNC-EI	98
281	FER	End	29-Jul-96	8	30.5200	8	28.5200	0.0000	0.0701	DNC-EI	99
282	FER	Mid	5-Feb-97	7	11.1600	7	10.9500	0.0000	0.0192	DNC-EI	100
283	FER	End	30-Jul-97	9	32.3400	8	30.5200	0.1250	0.0596	DI-EI	100
284	FER	Mid	4-Feb-98	8	6.9300	7	11.1600	0.1429	-0.3790	DI-ED	100
285	FER	End	29-Jul-98	10	34.1900	9	32.3400	0.1111	0.0572	DI-EI	100
286	FER	Mid	3-Feb-99	8	7.6800	8	6.9300	0.0000	0.1082	DNC-EI	100
287	FER	End	28-Jul-99	10	40.6800	10	34.1900	0.0000	0.1898	DNC-EI	100
288	FIR	End	1-Apr-93	5	0.1696	0	-0.0643	∞	3.6396	DI-EI	39
289	FIR	Mid	16-Sep-93	6	0.1970	0	-0.0121	∞	17.2520	DI-EI	76
290	FIR	Mid	13-Sep-95	6	0.2410	6	0.2609	0.0000	-0.0763	DNC-ED	31
291	FIR	Mid	5-Sep-96	10	21.4800	6	24.1000	0.6667	-0.1087	DI-ED	31
292	FLC	Mid	14-Feb-91	11.5	0.2099	11.5	0.2298	0.0000	-0.0866	DNC-ED	100
293	FLC	Mid	18-Feb-92	7	0.1203	11.5	0.2099	-0.3913	-0.4269	DD-ED	100
294	FLC	Mid	17-Feb-93	7	0.1010	7	0.0794	0.0000	0.2720	DNC-EI	100
295	FLC	End	18-Aug-93	7	0.2521	7	-0.1036	0.0000	3.4324	DNC-EI	99
296	FLC	Mid	23-Feb-94	6.25	0.3249	7	0.1010	-0.1071	2.2168	DD-EI	100
297	FLC	End	31-Aug-94	6.25	0.3547	7	0.2521	-0.1071	0.4069	DD-EI	100
298	FLC	Mid	22-Feb-95	6.25	0.0739	6.25	0.2961	0.0000	-0.7505	DNC-ED	100
299	FLC	End	30-Aug-95	6.25	0.2167	6.25	0.3108	0.0000	-0.3028	DNC-ED	99
300	FLC	Mid	28-Feb-96	8.5	0.1322	6.25	0.0739	0.3600	0.7890	DI-EI	100
301	FLCB	Mid	18-Feb-98	8	20.1100	6.5	16.2000	0.2308	0.2414	DI-EI	100
302	FLCB	End	12-Aug-98	6	34.5000	6.5	40.1200	-0.0769	-0.1401	DD-ED	100
303	FLCB	Mid	17-Feb-99	6	4.3600	8	20.1100	-0.2500	-0.7832	DD-ED	100
304	FLCB	End	18-Aug-99	6	22.2700	6	40.3700	0.0000	-0.4484	DNC-ED	100
305	FLCE	Mid	18-Feb-98	8.5	30.5200	8.5	25.3800	0.0000	0.2025	DNC-EI	100
306	FLCE	End	12-Aug-98	7.5	38.1900	8.5	69.5700	-0.1176	-0.4511	DD-ED	100
307	FLCE	Mid	17-Feb-99	7	10.1900	8.5	30.5200	-0.1765	-0.6661	DD-ED	100
308	FLCE	End	18-Aug-99	7	8.0200	7.5	46.4300	-0.0667	-0.8273	DD-ED	100
309	FLCF	End	30-Aug-95	3	0.1134	3	0.1622	0.0000	-0.3009	DNC-ED	99

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
310	FLCF	Mid	28-Feb-96	3	0.0800	3	0.0568	0.0000	0.4079	DNC-EI	100
311	FLCF	End	28-Aug-96	3	7.9800	3	13.8700	0.0000	-0.4247	DNC-ED	100
312	FLCF	Mid	26-Feb-97	3	4.5900	3	5.9800	0.0000	-0.2324	DNC-ED	100
313	FLCF	End	20-Aug-97	3	8.2800	3	7.9800	0.0000	0.0376	DNC-EI	100
314	FLCF	Mid	18-Feb-98	1	2.9400	3	4.5900	-0.6667	-0.3595	DD-ED	100
315	FLCF	End	12-Aug-98	0	2.0400	3	8.2800	-1.0000	-0.7536	DD-ED	100
316	FLCF	Mid	17-Feb-99	0	0.3300	1	2.9400	-1.0000	-0.8878	DD-ED	100
317	FLCF	End	18-Aug-99	0	0.7200	0	2.3200	∞	-0.6897	DI-ED	100
318	FLCP	Mid	18-Feb-98	3	-9.4500	3	-8.3700	0.0000	-0.1290	DNC-ED	100
319	FLCP	Mid	17-Feb-99	1.5	2.3300	3	-9.4500	-0.5000	1.2466	DD-EI	100
320	FOR	Mid	22-Feb-96	0.5	0.0131	0	0.0021	∞	5.1952	DI-EI	94
321	FOR	End	15-Aug-96	1	2.8800	0.5	1.7600	1.0000	0.6364	DI-EI	84
322	FOR	End	21-Aug-97	1	4.3500	1	2.8800	0.0000	0.5104	DNC-EI	93
323	FOR	Mid	11-Feb-98	1	1.9500	1	2.0000	0.0000	-0.0250	DNC-ED	76
324	FOR	End	24-Aug-98	3	3.9000	1	4.3500	2.0000	-0.1034	DI-ED	73
325	FOR	Mid	23-Feb-99	1	1.9600	1	1.9500	0.0000	0.0051	DNC-EI	95
326	FOR	End	31-Aug-99	3	5.0600	3	3.9000	0.0000	0.2974	DNC-EI	99
327	FRW	Mid	28-Feb-91	3	0.0789	3	0.0881	0.0000	-0.1052	DNC-ED	94
328	FRW	End	18-Sep-91	0	0.0955	5	0.0817	-1.0000	0.1688	DD-EI	95
329	FRW	End	17-Sep-92	2	0.0777	0	0.0955	∞	-0.1862	DI-ED	100
330	FRW	Mid	4-Mar-93	2	0.0259	1.5	0.0217	0.3333	0.1964	DI-EI	100
331	FRW	End	16-Sep-93	2	0.0379	2	0.0777	0.0000	-0.5123	DNC-ED	99
332	FRW	Mid	8-Mar-94	2	0.0248	2	0.0259	0.0000	-0.0428	DNC-ED	100
333	FRW	End	25-Aug-94	0	0.0007	2	0.0379	-1.0000	-0.9827	DD-ED	100
334	FSL	Mid	25-Nov-93	3.5	0.0209	3.5	0.0588	0.0000	-0.6440	DNC-ED	96
335	FSL	End	25-May-94	6.5	0.1512	6.5	0.2073	0.0000	-0.2706	DNC-ED	86
336	FSL	Mid	29-Nov-94	3.5	0.0169	3.5	0.0209	0.0000	-0.1905	DNC-ED	65
337	FSL	End	31-May-95	8.5	0.1739	6.5	0.1512	0.3077	0.1502	DI-EI	65
338	FSL	Mid	23-Nov-95	3.5	0.0083	3.5	0.0169	0.0000	-0.5073	DNC-ED	67
339	FSL	End	29-May-96	8.5	11.9300	8.5	17.5500	0.0000	-0.3202	DNC-ED	74
340	FSL	Mid	26-Nov-96	3.5	-1.4900	3.5	0.8400	0.0000	-2.7738	DNC-ED	50
341	FSL	End	28-May-97	5	8.8900	8.5	11.9300	-0.4118	-0.2548	DD-ED	50
342	FSL	Mid	27-Nov-97	2	-2.2500	3.5	-1.4900	-0.4286	-0.5101	DD-ED	48
343	FSL	End	4-Jun-98	5	8.4900	5	8.8900	0.0000	-0.0450	DNC-ED	34
344	FSL	Mid	3-Dec-98	2	-3.9700	2	-2.2500	0.0000	-0.7644	DNC-ED	39
345	FSL	End	26-May-99	5	8.6400	5	8.4900	0.0000	0.0177	DNC-EI	50
346	GMF	End	25-Sep-90	6	-0.0806	6	0.3080	0.0000	-1.2617	DNC-ED	100
347	GMF	End	20-Sep-91	6	0.1013	6	-0.0805	0.0000	2.2582	DNC-EI	100
348	GMF	Mid	6-Mar-92	5	0.0708	5	0.0631	0.0000	0.1215	DNC-EI	100
349	GMF	End	11-Sep-92	6	0.0446	6	0.1013	0.0000	-0.5599	DNC-ED	100
350	GMF	End	14-Sep-93	6	0.1570	6	0.0446	0.0000	2.5214	DNC-EI	99
351	GMF	End	2-Sep-94	6	0.0780	6	0.1570	0.0000	-0.5034	DNC-ED	100
352	GMF	Mid	3-Mar-95	0	0.0169	5	0.0532	-1.0000	-0.6811	DD-ED	100
353	GMF	End	11-Sep-95	5	-0.0441	6	0.0780	-0.1667	-1.5657	DD-ED	99
354	GMF	Mid	7-Mar-96	2.5	0.0383	0	0.0169	∞	1.2627	DI-EI	99
355	GMF	End	5-Sep-96	3	8.3000	5	-18.0100	-0.4000	1.4609	DD-EI	100
356	GMF	End	5-Sep-97	3.5	10.5300	3	8.3000	0.1667	0.2687	DI-EI	99
357	GMF	Mid	6-Mar-98	3.5	5.5900	3	4.9100	0.1667	0.1385	DI-EI	99
358	GMF	End	4-Sep-98	4	11.1000	3.5	10.5300	0.1429	0.0541	DI-EI	99
359	GMF	End	3-Sep-99	4	11.1000	4	8.3100	0.0000	0.3357	DNC-EI	100
360	GPG	End	12-Mar-98	0.3	2.5900	0.25	3.1800	0.2000	-0.1855	DI-ED	100
361	GPG	End	12-Mar-97	0.25	2.5900	0.25	3.1800	0.0000	-0.1855	DNC-ED	100

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
362	GRC	End	22-Nov-94	1.5	0.1203	0	-0.4557	∞	1.2639	DI-EI	39
363	GRC	End	30-Nov-95	0	-0.1344	1.5	0.1203	-1.0000	-2.1177	DD-ED	40
364	HBY	End	3-Sep-96	0	24.5600	1	25.1600	-1.0000	-0.0238	DD-ED	99
365	HBY	Mid	24-Feb-97	6	11.4500	6	10.4900	0.0000	0.0915	DNC-EI	98
366	HBY	End	8-Sep-97	7	24.3000	0	24.5600	∞	-0.0106	DI-ED	99
367	HBY	Mid	23-Feb-98	7	12.8600	6	11.4500	0.1667	0.1231	DI-EI	99
368	HBY	End	4-Sep-98	7	27.2800	7	24.3000	0.0000	0.1226	DNC-EI	99
369	HBY	Mid	19-Feb-99	7	11.9800	7	12.8600	0.0000	-0.0684	DNC-ED	100
370	HBY	End	8-Sep-99	7	27.9400	7	27.2800	0.0000	0.0242	DNC-EI	100
371	HED	End	21-May-97	14.5	35.0200	15	34.9200	-0.0333	0.0029	DD-EI	72
372	HED	Mid	10-Nov-97	11	17.7000	10	20.1500	0.1000	-0.1216	DI-ED	77
373	HED	End	8-May-98	14.5	36.0200	14.5	35.0200	0.0000	0.0286	DNC-EI	59
374	HED	Mid	10-Nov-98	11	12.5600	11	17.7000	0.0000	-0.2904	DNC-ED	61
375	HED	End	11-Jun-99	12	28.3000	14.5	36.0200	-0.1724	-0.2143	DD-ED	89
376	HLG	End	2-Oct-90	1.25	0.0441	0.75	0.0350	0.6667	0.2589	DI-EI	49
377	HLG	Mid	28-Mar-91	1.5	0.0423	1.5	0.0288	0.0000	0.4699	DNC-EI	36
378	HLG	End	20-Sep-91	1.75	0.0781	1.25	0.0441	0.4000	0.7718	DI-EI	73
379	HLG	Mid	10-Apr-92	2	0.0481	1.5	0.0423	0.3333	0.1387	DI-EI	87
380	HLG	End	25-Sep-92	3.25	0.1215	1.75	0.0725	0.8571	0.6759	DI-EI	99
381	HLG	Mid	26-Mar-93	3.5	0.0861	2	0.0481	0.7500	0.7896	DI-EI	98
382	HLG	End	1-Oct-93	7	0.1934	3.25	0.1215	1.1538	0.5918	DI-EI	97
383	HLG	Mid	31-Mar-94	7	0.1030	3.5	0.0861	1.0000	0.1963	DI-EI	95
384	HLG	End	30-Sep-94	10	0.2225	7	0.1934	0.4286	0.1499	DI-EI	96
385	HLG	Mid	4-Apr-95	9	0.1132	7	0.1030	0.2857	0.0992	DI-EI	95
386	HLG	End	2-Oct-95	12	0.2265	10	0.2225	0.2000	0.0181	DI-EI	93
387	HLG	Mid	29-Mar-96	9	0.1123	9	0.1132	0.0000	-0.0085	DNC-ED	99
388	HLG	End	4-Oct-96	12	21.5300	12	22.4700	0.0000	-0.0418	DNC-ED	97
389	HLG	Mid	24-Mar-97	7	8.2900	9	11.2300	-0.2222	-0.2618	DD-ED	100
390	HLG	End	30-Sep-97	12	19.3300	12	21.5300	0.0000	-0.1022	DNC-ED	100
391	HLG	Mid	24-Mar-98	7	7.9500	7	8.2900	0.0000	-0.0410	DNC-ED	97
392	HLG	End	29-Sep-98	9	16.3200	12	19.3300	-0.2500	-0.1557	DD-ED	100
393	HLG	Mid	30-Mar-99	8	9.5900	7	7.9500	0.1429	0.2063	DI-EI	100
394	HLG	End	1-Oct-99	9	17.0700	9	16.3300	0.0000	0.0453	DNC-EI	100
395	IFA	End	30-Aug-99	1.85	-3.7600	1.3	1.7500	0.4231	-3.1486	DI-ED	80
396	IFT	End	8-May-96	1.66	0.0386	0	0.0236	∞	0.6380	DI-EI	100
397	IFT	Mid	23-Oct-96	0.75	0.9400	0	1.3100	∞	-0.2824	DI-ED	100
398	IFT	End	7-May-97	2.25	4.0800	1.66	3.8600	0.3554	0.0570	DI-EI	100
399	IFT	End	22-Apr-98	3	5.2200	2.25	4.0800	0.3333	0.2794	DI-EI	100
400	IFT	Mid	20-Oct-98	2.75	4.1400	2	1.6500	0.3750	1.5091	DI-EI	99
401	INL	Mid	8-Feb-91	7	0.2771	6	0.2190	0.1667	0.2655	DI-EI	82
402	INL	Mid	21-Feb-92	7	0.1321	7	0.2101	0.0000	-0.3710	DNC-ED	91
403	INL	End	21-Aug-92	8	0.2633	7	0.1415	0.1429	0.8611	DI-EI	98
404	INL	Mid	17-Feb-95	10	0.2177	9	0.4599	0.1111	-0.5267	DI-ED	98
405	INL	End	18-Aug-95	10	0.3887	9	0.3650	0.1111	0.0650	DI-EI	99
406	INL	Mid	16-Feb-96	11	0.2015	10	0.2177	0.1000	-0.0741	DI-ED	100
407	INL	End	16-Aug-96	11	41.6400	10	38.8700	0.1000	0.0713	DI-EI	100
408	INL	Mid	24-Feb-97	11	25.3100	11	22.7900	0.0000	0.1106	DNC-EI	100
409	INL	End	15-Aug-97	12	49.9400	11	41.6400	0.0909	0.1993	DI-EI	100
410	INL	Mid	20-Feb-98	11	24.8900	11	25.3100	0.0000	-0.0166	DNC-ED	97
411	INL	End	21-Aug-98	12	44.5300	12	49.9400	0.0000	-0.1083	DNC-ED	100
412	INL	Mid	19-Feb-99	12	23.7800	11	24.8900	0.0909	-0.0446	DI-ED	100
413	INL	End	3-Sep-99	12	37.4900	12	44.5300	0.0000	-0.1581	DNC-ED	100

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
414	JFA	End	22-Aug-97	4	7.4200	0	-7.2400	∞	2.0249	DI-EI	69
415	LNN	Mid	16-May-91	5.5	0.0941	5.5	0.0824	0.0000	0.1418	DNC-EI	100
416	LNN	Mid	4-May-92	5.5	0.1152	5.5	0.0941	0.0000	0.2248	DNC-EI	100
417	LNN	End	4-Nov-92	7	0.2686	7	0.1778	0.0000	0.5109	DNC-EI	100
418	LNN	Mid	5-May-93	6.5	0.1831	5.5	0.1152	0.1818	0.5886	DI-EI	100
419	LNN	End	3-Nov-93	7	0.1575	7	0.2686	0.0000	-0.4138	DNC-ED	100
420	LNN	Mid	28-Apr-94	7.5	0.2305	6.5	0.1831	0.1538	0.2588	DI-EI	100
421	LNN	End	26-Oct-94	7.5	0.4508	7	0.1575	0.0714	1.8625	DI-EI	100
422	LNN	End	26-Oct-95	8	0.3694	7.5	0.4508	0.0667	-0.1805	DI-ED	99
423	LNN	Mid	18-Apr-96	8	0.1665	8	0.2448	0.0000	-0.3199	DNC-ED	100
424	LNN	End	31-Oct-96	8	28.3900	8	40.4000	0.0000	-0.2973	DNC-ED	100
425	LNN	Mid	28-Apr-97	8	13.1800	8	16.6500	0.0000	-0.2084	DNC-ED	100
426	LNN	End	30-Oct-97	8	23.1200	8	28.3900	0.0000	-0.1856	DNC-ED	100
427	LNN	End	28-Oct-98	8	24.8500	8	23.1200	0.0000	0.0748	DNC-EI	100
428	LNN	Mid	30-Apr-99	8	15.1500	8	15.1000	0.0000	0.0033	DNC-EI	100
429	LPC	End	10-Aug-98	3.55	12.1400	3.5	12.1100	0.0143	0.0025	DI-EI	84
430	LPC	Mid	8-Feb-99	2.75	5.3500	2.75	5.4400	0.0000	-0.0165	DNC-ED	88
431	LPC	End	9-Aug-99	4.55	12.9600	3.55	12.1400	0.2817	0.0675	DI-EI	81
432	LWR	Mid	22-Feb-95	6	0.1114	5	0.1154	0.2000	-0.0347	DI-ED	95
433	LWR	End	11-Aug-95	9	0.2593	8	0.2709	0.1250	-0.0429	DI-ED	98
434	LWR	Mid	23-Feb-96	6	0.0974	6	0.1114	0.0000	-0.1259	DNC-ED	99
435	LWR	End	9-Aug-96	9	21.0900	9	25.9300	0.0000	-0.1867	DNC-ED	96
436	LWR	Mid	26-Feb-97	6	7.1600	6	9.7300	0.0000	-0.2641	DNC-ED	97
437	LWR	End	13-Aug-97	9	17.7100	9	21.0900	0.0000	-0.1603	DNC-ED	95
438	LWR	Mid	25-Feb-98	6	7.3600	6	7.1600	0.0000	0.0279	DNC-EI	90
439	LWR	Mid	3-Mar-99	4	4.5700	6	7.3600	-0.3333	-0.3791	DD-ED	95
440	MAI	End	13-Sep-90	2.5	0.1316	0	0.0824	∞	0.5965	DI-EI	69
441	MAI	End	26-Sep-91	0	0.1343	2.5	0.1316	-1.0000	0.0207	DD-EI	59
442	MAI	End	27-Aug-92	7.5	0.2547	0	0.1343	∞	0.8966	DI-EI	99
443	MAI	End	16-Sep-93	0	-0.1048	7.5	0.2547	-1.0000	-1.4113	DD-ED	98
444	MAI	Mid	16-Mar-94	0	0.0011	5	0.0644	-1.0000	-0.9821	DD-ED	97
445	MAI	End	12-Sep-95	2	0.0596	0	0.0282	∞	1.1097	DI-EI	92
446	MBN	Mid	3-Sep-90	8	0.2049	6	0.1679	0.3333	0.2204	DI-EI	22
447	MBN	End	8-Mar-91	12	0.3978	12	0.3763	0.0000	0.0571	DNC-EI	16
448	MBN	Mid	23-Aug-91	8	0.1226	8	0.2049	0.0000	-0.4014	DNC-ED	25
449	MBN	End	13-Mar-92	12	0.2953	12	0.3978	0.0000	-0.2575	DNC-ED	42
450	MBN	Mid	21-Aug-92	8	0.2140	8	0.1226	0.0000	0.7448	DNC-EI	42
451	MBN	End	15-Mar-93	14	0.4084	12	0.2953	0.1667	0.3829	DI-EI	50
452	MBN	Mid	23-Aug-93	11	0.2726	8	0.2139	0.3750	0.2746	DI-EI	74
453	MBN	End	14-Mar-94	22	0.6982	14	0.4084	0.5714	0.7095	DI-EI	79
454	MBN	Mid	22-Aug-94	15	0.4741	11	0.2726	0.3636	0.7394	DI-EI	70
455	MBN	End	13-Mar-95	30	0.1896	22	0.6982	0.3636	-0.7284	DI-ED	64
456	MBN	End	11-Mar-96	8	0.2072	30	0.1896	-0.7333	0.0928	DD-EI	81
457	MBN	Mid	26-Aug-96	4	11.2900	4	11.1500	0.0000	0.0126	DNC-EI	92
458	MBN	End	10-Mar-97	9	22.0800	8	20.7200	0.1250	0.0656	DI-EI	97
459	MBN	Mid	25-Aug-97	4	11.2700	4	11.2900	0.0000	-0.0018	DNC-ED	99
460	MBN	End	16-Mar-98	8.5	24.9600	9	22.0800	-0.0556	0.1304	DD-EI	87
461	MCH	Mid	25-Nov-94	0	0.0376	2	0.0680	-1.0000	-0.4474	DD-ED	26
462	MCH	End	23-May-95	1	0.0465	1	0.1256	0.0000	-0.6301	DNC-ED	13
463	MCH	End	22-May-96	2	1.4817	1	1.3559	1.0000	0.0928	DI-EI	23
464	MCH	Mid	6-Nov-96	2.5	4.1100	2	3.5100	0.2500	0.1709	DI-EI	22
465	MCH	End	15-May-97	2	5.9800	2	6.0200	0.0000	-0.0066	DNC-ED	27

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
466	MCH	Mid	20-Nov-97	2	3.1500	2.5	4.1100	-0.2000	-0.2336	DD-ED	31
467	MCH	End	5-Jun-98	2	3.5200	2	5.9800	0.0000	-0.4114	DNC-ED	18
468	MCH	Mid	23-Nov-98	2	3.3500	2	3.1500	0.0000	0.0635	DNC-EI	35
469	MCH	End	11-Jun-99	2	3.4300	2	3.5200	0.0000	-0.0256	DNC-ED	25
470	MDL	End	15-Sep-97	4	26.8800	0	23.1600	∞	0.1606	DI-EI	33
471	MDL	End	14-Sep-98	5	36.2100	4	26.8800	0.2500	0.3471	DI-EI	21
472	MDL	End	13-Sep-99	10	47.9300	5	36.2100	1.0000	0.3237	DI-EI	22
473	MET	End	14-Mar-96	0.5	0.0102	0.5	0.0417	0.0000	-0.7561	DNC-ED	72
474	MET	Mid	2-Sep-96	1	2.5100	0.5	-0.0400	1.0000	63.7500	DI-EI	77
475	MET	End	5-Mar-97	2	6.3400	0.5	0.6900	3.0000	8.1884	DI-EI	94
476	MET	Mid	13-Aug-97	2	4.0700	1	2.5100	1.0000	0.6215	DI-EI	97
477	MET	End	3-Mar-98	3	11.1900	2	6.3400	0.5000	0.7650	DI-EI	93
478	MET	End	4-Mar-99	3	11.5900	3	11.1900	0.0000	0.0357	DNC-EI	99
479	MET	Mid	13-Sep-99	1.5	2.4400	3	6.9800	-0.5000	-0.6504	DD-ED	99
480	MFT	Mid	10-Nov-97	2.5	4.3700	2.5	4.0900	0.0000	0.0685	DNC-EI	97
481	MFT	End	11-Jun-98	3	0.5500	3	10.8400	0.0000	-0.9493	DNC-ED	90
482	MFT	End	10-Jun-99	3	10.0800	3	10.5500	0.0000	-0.0445	DNC-ED	96
483	MFT	Mid	17-Nov-99	3	4.2000	2.5	3.1800	0.2000	0.3208	DI-EI	85
484	MHI	End	23-Aug-90	2.8	0.1097	2.5	0.0957	0.1200	0.1469	DI-EI	50
485	MHI	End	21-Aug-91	2.45	0.0934	2.8	0.1097	-0.1250	-0.1489	DD-ED	54
486	MHI	Mid	18-Feb-93	1.3	0.0692	1.3	0.0831	0.0000	-0.1670	DNC-ED	98
487	MHI	End	25-Aug-93	2	0.0802	2.55	0.1038	-0.2157	-0.2275	DD-ED	95
488	MHI	Mid	18-Feb-94	1.4	0.0707	1.3	0.0692	0.0769	0.0216	DI-EI	96
489	MHI	End	18-Aug-94	2	0.0665	2	0.0802	0.0000	-0.1706	DNC-ED	90
490	MHI	Mid	15-Feb-95	2.3	0.1017	1.4	0.0707	0.6429	0.4382	DI-EI	84
491	MHI	End	17-Aug-95	2.2	0.1092	2	0.0665	0.1000	0.6423	DI-EI	97
492	MHI	Mid	16-Feb-96	3	0.1071	2.3	0.1017	0.3043	0.0530	DI-EI	92
493	MHI	End	15-Aug-96	3.5	13.7900	2.2	11.3600	0.5909	0.2139	DI-EI	92
494	MHI	Mid	25-Feb-97	3.5	11.3200	3	10.7100	0.1667	0.0570	DI-EI	93
495	MHI	End	12-Aug-97	3.5	13.3700	3.5	13.7900	0.0000	-0.0305	DNC-ED	93
496	MHI	Mid	20-Feb-98	4.5	13.6400	3.5	11.3200	0.2857	0.2049	DI-EI	75
497	MHI	End	18-Aug-98	5	18.6500	3.5	13.3700	0.4286	0.3949	DI-EI	72
498	MHI	Mid	17-Feb-99	5.5	16.9200	4.5	13.6400	0.2222	0.2405	DI-EI	82
499	MHI	End	20-Aug-99	6	22.7600	5	18.6500	0.2000	0.2204	DI-EI	82
500	MMC	End	1-Mar-93	4	0.0949	0	0.0970	∞	-0.0210	DI-ED	94
501	MMC	End	4-Mar-94	4	0.0649	4	0.0533	0.0000	0.2169	DNC-EI	87
502	MMC	End	2-Mar-95	5	0.0553	4	0.0649	0.2500	-0.1474	DI-ED	55
503	MMC	End	11-Mar-98	2	3.5200	2	12.4000	0.0000	-0.7161	DNC-ED	93
504	MON	End	14-Sep-90	5	0.1561	5	0.2163	0.0000	-0.2785	DNC-ED	98
505	MON	End	16-Sep-91	4	0.0751	5	0.1561	-0.2000	-0.5188	DD-ED	100
506	MON	End	1-Oct-92	0	0.0555	4	0.0853	-1.0000	-0.3496	DD-ED	100
507	MON	Mid	18-Feb-98	1.5	2.6500	0	2.5800	∞	0.0271	DI-EI	100
508	MON	End	26-Aug-98	1.5	4.8000	0	4.6300	∞	0.0367	DI-EI	100
509	MON	End	17-Aug-99	3	4.8000	1.5	5.6700	1.0000	-0.1534	DI-ED	100
510	MPL	Mid	4-Dec-95	3.7	0.1069	4	0.2654	-0.0750	-0.5973	DD-ED	71
511	MPL	End	23-May-96	5.7	14.9500	3.8	15.6700	0.5000	-0.0459	DI-ED	81
512	MPL	Mid	22-Nov-96	5	10.7000	3.7	10.6900	0.3514	0.0009	DI-EI	69
513	MTG	Mid	29-Nov-91	0	0.0036	1.25	0.0141	-1.0000	-0.7482	DD-ED	64
514	MTG	Mid	20-Nov-92	0	0.0099	0	0.0036	∞	1.7836	DI-EI	88
515	MTG	Mid	22-Nov-93	1.25	0.0151	0	0.0099	∞	0.5289	DI-EI	100
516	MTG	End	10-Jun-94	1.5	0.0401	0	0.0202	∞	0.9863	DI-EI	100
517	MTG	Mid	18-Nov-94	1.75	0.0275	1.25	0.0151	0.4000	0.8209	DI-EI	98

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
518	MTG	End	9-Jun-95	1.75	0.0493	1.5	0.0401	0.1667	0.2315	DI-EI	95
519	NCH	End	25-Aug-94	12	0.8101	6	0.4235	1.0000	0.9131	DI-EI	97
520	NCH	Mid	16-Feb-95	9	0.3071	3	0.6159	2.0000	-0.5014	DI-ED	94
521	NCH	End	24-Aug-95	13	0.5285	12	0.8101	0.0833	-0.3475	DI-ED	95
522	NCH	End	21-Aug-96	15	11.8100	13	4.8000	0.1538	1.4604	DI-EI	98
523	NCH	Mid	19-Feb-97	11	6.8200	10	6.4200	0.1000	0.0623	DI-EI	100
524	NCH	Mid	18-Feb-98	5	5.6500	11	6.8200	-0.5455	-0.1716	DD-ED	100
525	NCH	End	19-Aug-98	6	18.5400	24	13.9300	-0.7500	0.3309	DD-EI	100
526	NCH	Mid	18-Feb-99	5	6.3800	5	5.6500	0.0000	0.1292	DNC-EI	100
527	NLL	Mid	6-Mar-92	2.5	0.0820	0	0.0535	∞	0.5327	DI-EI	26
528	NLL	End	11-Sep-92	5	0.1965	5	0.1158	0.0000	0.6964	DNC-EI	68
529	NLL	End	14-Feb-97	5	17.1200	0	0.2000	∞	84.6000	DI-EI	24
530	NLL	End	25-Feb-98	10	19.7500	5	17.1200	1.0000	0.1536	DI-EI	26
531	NLL	Mid	20-Aug-98	5	15.0500	0	10.8200	∞	0.3909	DI-EI	22
532	NMH	Mid	26-May-98	4.25	8.2300	4	10.2000	0.0625	-0.1931	DI-ED	20
533	NOG	End	10-Sep-98	2.5	3.6000	0	1.8300	∞	0.9672	DI-EI	98
534	NOG	End	14-Sep-99	0	-0.6200	2.5	3.6000	-1.0000	-1.1722	DD-ED	98
535	NPR	End	7-Sep-94	5	0.0693	3	0.0790	0.6667	-0.1220	DI-ED	64
536	NPR	End	7-Sep-95	5	0.0529	5	0.0693	0.0000	-0.2366	DNC-ED	34
537	NPR	End	26-Aug-96	0	4.8200	5	5.2900	-1.0000	-0.0888	DD-ED	37
538	NPX	End	24-Aug-90	2.75	0.2564	2.75	0.1536	0.0000	0.6690	DNC-EI	20
539	NPX	End	22-Aug-91	2.75	0.1779	2.75	0.2564	0.0000	-0.3061	DNC-ED	20
540	NPX	End	21-Aug-92	4.5	0.2316	2.75	0.1779	0.6364	0.3020	DI-EI	95
541	NPX	Mid	19-Feb-93	6.5	0.1433	8.5	0.1675	-0.2353	-0.1444	DD-ED	89
542	NPX	End	20-Aug-93	8.5	0.2944	4.5	0.2316	0.8889	0.2711	DI-EI	94
543	NPX	Mid	18-Feb-94	8.5	0.1890	6.5	0.1433	0.3077	0.3186	DI-EI	90
544	NPX	End	19-Aug-94	8.5	0.3382	8.5	0.2944	0.0000	0.1485	DNC-EI	88
545	NPX	Mid	17-Feb-95	8.5	0.1909	8.5	0.1890	0.0000	0.0102	DNC-EI	76
546	NPX	End	18-Aug-95	9.5	0.3601	8.5	0.3382	0.1176	0.0650	DI-EI	93
547	NPX	Mid	23-Feb-96	10	0.2157	8.5	0.1909	0.1765	0.1299	DI-EI	88
548	NPX	End	23-Aug-96	10	40.5000	9.5	36.5200	0.0526	0.1090	DI-EI	89
549	NPX	Mid	21-Feb-97	5.5	18.8000	10	21.3300	-0.4500	-0.1186	DD-ED	96
550	NPX	End	22-Aug-97	5	29.7300	10	40.5000	-0.5000	-0.2659	DD-ED	97
551	NPX	Mid	20-Feb-98	5.5	10.2400	5.5	18.8000	0.0000	-0.4553	DNC-ED	95
552	NPX	End	28-Aug-98	5	14.9300	5	29.7300	0.0000	-0.4978	DNC-ED	100
553	NPX	Mid	26-Feb-99	5.5	10.0800	5.5	10.2400	0.0000	-0.0156	DNC-ED	99
554	NPX	End	20-Aug-99	5	21.1800	5	19.8000	0.0000	0.0697	DNC-EI	100
555	NTH	Mid	13-May-94	2.25	0.0847	2	0.0793	0.1250	0.0685	DI-EI	71
556	NTH	End	24-Nov-94	5	0.1820	4.5	0.1568	0.1111	0.1606	DI-EI	54
557	NTH	Mid	19-May-95	2.5	0.0926	2.25	0.0847	0.1111	0.0940	DI-EI	47
558	NTH	End	23-Nov-95	4.75	0.1689	5	0.1820	-0.0500	-0.0725	DD-ED	59
559	NTH	Mid	17-May-96	2.75	10.2400	2.5	9.2600	0.1000	0.1058	DI-EI	77
560	NTH	End	21-Nov-96	5.5	20.5900	4.75	16.8900	0.1579	0.2191	DI-EI	79
561	NTH	Mid	16-May-97	2.75	7.5300	2.75	10.2400	0.0000	-0.2646	DNC-ED	87
562	NTH	End	20-Nov-97	5.5	17.1700	5.5	20.5900	0.0000	-0.1661	DNC-ED	74
563	NTH	Mid	22-May-98	1.75	3.1300	2.75	7.5300	-0.3636	-0.5843	DD-ED	59
564	NTH	End	18-Nov-98	4.75	7.5900	5.5	17.1700	-0.1364	-0.5579	DD-ED	76
565	NTH	Mid	14-May-99	2	3.3600	1.75	3.1300	0.1429	0.0735	DI-EI	77
566	NZR	Mid	30-Aug-90	20	0.7122	15	0.1819	0.3333	2.9157	DI-EI	45
567	NZR	End	1-Mar-91	30	1.5564	20	0.4075	0.5000	2.8194	DI-EI	44
568	NZR	Mid	29-Aug-91	25	0.9737	20	0.7122	0.2500	0.3672	DI-EI	81
569	NZR	End	28-Feb-92	45	2.0645	30	1.5564	0.5000	0.3264	DI-EI	79

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
570	NZR	Mid	27-Aug-92	50	1.0135	25	0.9737	1.0000	0.0409	DI-EI	81
571	NZR	End	25-Feb-93	75	2.0645	45	1.5564	0.6667	0.3264	DI-EI	75
572	NZR	Mid	26-Aug-93	65	1.1620	50	1.0135	0.3000	0.1466	DI-EI	93
573	NZR	Mid	25-Aug-94	65	1.2604	65	1.1620	0.0000	0.0847	DNC-EI	82
574	NZR	End	23-Feb-95	90	2.0250	80	2.3553	0.1250	-0.1402	DI-ED	67
575	NZR	Mid	1-Sep-95	50	0.5765	70	1.2604	-0.2857	-0.5426	DD-ED	68
576	NZR	End	22-Feb-96	100	2.1360	90	2.0250	0.1111	0.0548	DI-EI	84
577	NZR	Mid	29-Aug-96	75	115.0300	50	57.1500	0.5000	1.0128	DI-EI	66
578	NZR	End	27-Feb-97	85	193.9000	100	163.0700	-0.1500	0.1891	DD-EI	73
579	NZR	Mid	28-Aug-97	35	32.2900	75	115.0300	-0.5333	-0.7193	DD-ED	78
580	NZR	End	26-Feb-98	65	110.7100	85	193.9000	-0.2353	-0.4290	DD-ED	72
581	NZR	Mid	27-Aug-98	50	65.4400	35	32.2900	0.4286	1.0266	DI-EI	86
582	NZR	End	25-Feb-99	50	98.3800	65	110.7100	-0.2308	-0.1114	DD-ED	92
583	NZR	Mid	26-Aug-99	10	7.2000	50	65.4400	-0.8000	-0.8900	DD-ED	86
584	OTR	End	3-Oct-90	2.5	0.0541	2.5	0.1278	0.0000	-0.5766	DNC-ED	54
585	OTR	End	30-Sep-91	2.5	0.0943	2.5	0.0542	0.0000	0.7401	DNC-EI	72
586	OTR	End	1-Oct-92	0	0.0670	2.5	0.0943	-1.0000	-0.2896	DD-ED	90
587	OTR	Mid	15-Mar-93	2	0.0093	2.5	0.0377	-0.2000	-0.7542	DD-ED	86
588	OTR	Mid	10-Mar-94	0	0.0474	2	0.0093	-1.0000	4.1131	DD-EI	98
589	OWN	Mid	7-Dec-90	4	0.0487	0	0.0371	∞	0.3133	DI-EI	52
590	OWN	Mid	18-Nov-91	2	0.0543	4	0.0487	-0.5000	0.1150	DD-EI	81
591	OWN	End	2-Jun-92	4	0.1011	4	0.0917	0.0000	0.1027	DNC-EI	93
592	OWN	Mid	20-Nov-92	2.5	0.0511	2	0.0543	0.2500	-0.0590	DI-ED	98
593	OWN	End	11-Jun-93	4.5	0.1229	4	0.1011	0.1250	0.2150	DI-EI	94
594	OWN	Mid	3-Dec-93	2.5	0.0657	4	0.0528	-0.3750	0.2435	DD-EI	99
595	OWN	End	9-Jun-94	5	0.1263	4.5	0.1229	0.1111	0.0282	DI-EI	95
596	OWN	Mid	30-Nov-94	3	0.0782	2.5	0.0657	0.2000	0.1905	DI-EI	87
597	OWN	End	31-May-95	5.75	0.1546	5	0.1263	0.1500	0.2241	DI-EI	78
598	OWN	Mid	20-Nov-95	4	0.0822	3	0.0782	0.3333	0.0509	DI-EI	80
599	OWN	Mid	27-Nov-96	4	7.8600	4	7.5500	0.0000	0.0411	DNC-EI	89
600	OWN	End	29-May-98	6	12.4200	6	14.5100	0.0000	-0.1440	DNC-ED	92
601	OWN	Mid	11-Dec-98	4	4.1000	4	6.0800	0.0000	-0.3257	DNC-ED	99
602	OWN	Mid	26-Nov-99	3	3.8800	4	4.1000	-0.2500	-0.0537	DD-ED	95
603	PBF	End	13-Aug-93	4.2	0.1323	0	0.1202	∞	0.1011	DI-EI	98
604	PBF	Mid	11-Feb-94	2.5	0.0322	3	0.0389	-0.1667	-0.1733	DD-ED	100
605	PBF	End	12-Aug-94	3.1	0.1060	4.2	0.1323	-0.2619	-0.1989	DD-ED	98
606	PBF	Mid	20-Feb-95	2	0.0288	2.5	0.0322	-0.2000	-0.1056	DD-ED	94
607	PBF	End	15-Aug-95	2	0.0650	3.1	0.1060	-0.3548	-0.3864	DD-ED	97
608	PBF	Mid	19-Feb-96	0	-0.0383	2	0.0288	-1.0000	-2.3332	DD-ED	76
609	PDL	Mid	22-Nov-93	25	0.5156	10	0.4727	1.5000	0.0909	DI-EI	98
610	PDL	End	10-Jun-94	15	0.9746	5	0.8571	2.0000	0.1371	DI-EI	97
611	PDL	Mid	18-Nov-94	15	0.5642	15	0.5156	0.0000	0.0942	DNC-EI	87
612	PDL	End	12-Jun-95	13	1.0013	15	0.9746	-0.1333	0.0274	DD-EI	93
613	PDL	End	7-Jun-96	13	80.1100	13	102.8900	0.0000	-0.2214	DNC-ED	95
614	PDL	Mid	12-Nov-96	20	30.8300	27	56.9500	-0.2593	-0.4586	DD-ED	97
615	PDL	End	4-Jun-97	20	83.6100	13	80.3200	0.5385	0.0410	DI-EI	96
616	PDL	Mid	11-Nov-97	20	49.4100	20	30.8300	0.0000	0.6027	DNC-EI	99
617	PDL	End	15-Jun-98	20	82.7400	20	83.6100	0.0000	-0.0104	DNC-ED	87
618	PDL	Mid	19-Nov-98	20	16.3600	20	49.4100	0.0000	-0.6689	DNC-ED	99
619	PDL	End	14-Jun-99	0	12.8900	20	72.3200	-1.0000	-0.8218	DD-ED	99
620	PDL	Mid	26-Nov-99	20	22.3500	20	16.3600	0.0000	0.3661	DNC-EI	95
621	PFI	End	20-Feb-97	3.08	6.2000	2.61	7.2300	0.1801	-0.1425	DI-ED	90

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
622	PFI	End	18-Feb-98	3.9	6.2700	3.08	6.5100	0.2662	-0.0369	DI-ED	87
623	PFI	End	23-Feb-99	2.43	4.8800	3.9	6.2700	-0.3769	-0.2217	DD-ED	100
624	POA	End	15-Aug-95	6	0.2113	5	0.1590	0.2000	0.3291	DI-EI	99
625	POA	Mid	13-Feb-96	8	0.1286	5	0.1037	0.6000	0.2400	DI-EI	99
626	POA	End	13-Aug-96	10	29.6200	6	21.1300	0.6667	0.4018	DI-EI	97
627	POA	Mid	18-Feb-97	9	13.1000	8	15.1700	0.1250	-0.1365	DI-ED	99
628	POA	Mid	17-Feb-98	9	15.4900	9	13.1000	0.0000	0.1824	DNC-EI	99
629	POA	Mid	16-Feb-99	9	13.1800	9	15.4900	0.0000	-0.1491	DNC-ED	99
630	POA	End	17-Aug-99	9	27.9600	9	28.3100	0.0000	-0.0124	DNC-ED	100
631	POT	Mid	5-May-93	2	0.0391	2	0.0436	0.0000	-0.1034	DNC-ED	98
632	POT	End	29-Nov-93	3	0.0790	2.8	0.0933	0.0714	-0.1539	DI-ED	100
633	POT	End	21-Nov-94	3.2	0.1020	3	0.0790	0.0667	0.2920	DI-EI	92
634	POT	Mid	8-May-95	2	0.0468	2	0.0402	0.0000	0.1651	DNC-EI	93
635	POT	Mid	16-Feb-96	2.4	0.0578	2	0.0484	0.2000	0.1934	DI-EI	88
636	POT	End	26-Aug-96	4.1	11.8500	2.1	10.5000	0.9524	0.1286	DI-EI	83
637	POT	Mid	3-Mar-97	3.5	6.9100	2.4	5.7800	0.4583	0.1955	DI-EI	95
638	POT	End	25-Aug-97	7.5	15.9800	4.1	11.8500	0.8293	0.3485	DI-EI	94
639	POT	Mid	2-Mar-98	5	8.8300	3.5	6.9100	0.4286	0.2779	DI-EI	88
640	POT	End	1-Sep-98	8	15.2400	7.5	15.9800	0.0667	-0.0463	DI-ED	81
641	POT	End	27-Aug-99	13	23.6800	8	15.2400	0.6250	0.5538	DI-EI	83
642	PRG	End	29-May-95	3	0.2288	3	0.2032	0.0000	0.1256	DNC-EI	89
643	PRG	Mid	14-Nov-95	2	0.0617	5	0.1505	-0.6000	-0.5899	DD-ED	92
644	PRG	End	29-May-96	1	7.5200	3	20.4800	-0.6667	-0.6328	DD-ED	90
645	PRG	Mid	2-Dec-96	1	2.0500	2	6.1700	-0.5000	-0.6677	DD-ED	89
646	PRG	End	3-Jun-98	3	13.7100	2	4.7500	0.5000	1.8863	DI-EI	59
647	PRG	Mid	11-Nov-98	3	6.3900	3	7.3500	0.0000	-0.1306	DNC-ED	70
648	PRG	End	15-Jun-99	0	12.9300	3	13.7100	-1.0000	-0.0569	DD-ED	77
649	PRG	Mid	2-Dec-99	0	7.5600	3	6.3900	-1.0000	0.1831	DD-EI	86
650	PRO	Mid	31-Mar-94	3.5	0.0314	5.5	0.0916	-0.3636	-0.6569	DD-ED	99
651	PRO	Mid	23-Mar-95	4	0.0458	3.5	0.0314	0.1429	0.4566	DI-EI	95
652	PRO	End	28-Sep-95	4	0.0791	3.5	0.0400	0.1429	0.9780	DI-EI	99
653	PRO	Mid	1-Apr-96	0	0.0092	4	0.0458	-1.0000	-0.7997	DD-ED	100
654	PRO	End	30-Sep-96	0	2.2800	4	8.1100	-1.0000	-0.7189	DD-ED	100
655	PRO	Mid	27-Mar-97	2	3.2300	0	0.8900	∞	2.6292	DI-EI	97
656	PRO	End	1-Oct-97	2.5	8.5900	0	2.2800	∞	2.7675	DI-EI	99
657	PRO	Mid	2-Apr-98	2	4.2900	2	3.2300	0.0000	0.3282	DNC-EI	95
658	PRO	End	15-Sep-98	3	7.5800	2.5	8.5900	0.2000	-0.1176	DI-ED	93
659	PYN	Mid	4-Nov-91	7	0.0046	0	-0.0437	∞	1.1063	DI-EI	20
660	PYN	Mid	30-Nov-92	0	-0.0244	7	0.0450	-1.0000	-1.5414	DD-ED	71
661	PYN	Mid	15-Nov-94	2.5	0.0704	0	0.0572	∞	0.2322	DI-EI	88
662	PYN	Mid	15-Nov-95	0	-0.1608	2.5	0.0704	-1.0000	-3.2839	DD-ED	86
663	PYN	End	13-May-96	0	-8.6000	2.5	15.3000	-1.0000	-1.5621	DD-ED	80
664	RBD	Mid	9-Jul-99	4.5	8.4200	3	3.9900	0.5000	1.1103	DI-EI	100
665	RCH	End	18-Sep-92	1	0.0514	0	-0.0405	∞	2.2669	DI-EI	100
666	RCH	Mid	18-Mar-93	1	0.0129	1	0.0292	0.0000	-0.5580	DNC-ED	100
667	RCH	End	20-Sep-93	0	-0.0193	1	0.0514	-1.0000	-1.3759	DD-ED	99
668	RCH	End	10-Mar-97	0.5	0.5500	1	-0.4900	-0.5000	2.1224	DD-EI	100
669	RCH	End	4-Mar-98	5	6.2500	0.5	0.5500	9.0000	10.3636	DI-EI	97
670	RCH	End	16-Mar-99	0	-39.9000	5	6.2500	-1.0000	-7.3840	DD-ED	99
671	REI	End	23-Aug-93	4	0.0721	4	0.0881	0.0000	-0.1817	DNC-ED	88
672	REI	End	28-Aug-95	4	0.0675	4	0.0758	0.0000	-0.1086	DNC-ED	69
673	REI	End	26-Aug-96	4	5.9200	4	6.7500	0.0000	-0.1230	DNC-ED	80

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
674	REI	End	26-Aug-97	4	5.7900	4	5.9200	0.0000	-0.0220	DNC-ED	79
675	REI	End	31-Aug-98	4	6.4500	4	5.7900	0.0000	0.1140	DNC-EI	57
676	REI	End	30-Aug-99	4.5	7.1500	4	6.4500	0.1250	0.1085	DI-EI	73
677	RIL	End	28-Jun-91	9	0.2080	7	0.2507	0.2857	-0.1702	DI-ED	6
678	RIL	End	25-Jun-92	7.5	0.0916	9	0.2080	-0.1667	-0.5598	DD-ED	8
679	RIL	End	25-Jun-93	7.5	0.1236	7.5	0.0916	0.0000	0.3495	DNC-EI	13
680	RIL	Mid	10-Dec-93	4	0.0676	0	0.0516	∞	0.3103	DI-EI	30
681	RIL	End	29-Jun-94	0	0.0756	7.5	0.1236	-1.0000	-0.3885	DD-ED	33
682	RNS	End	12-Jun-95	5.5	0.1652	0	-0.0028	∞	60.7687	DI-EI	79
683	RNS	Mid	6-Aug-96	3	6.1000	2	4.2300	0.5000	0.4421	DI-EI	75
684	RNS	Mid	21-Aug-97	2	4.2700	3	6.1000	-0.3333	-0.3000	DD-ED	83
685	RNS	Mid	24-Jul-98	0	0.7300	2	4.2700	-1.0000	-0.8290	DD-ED	62
686	ROT	Mid	13-Nov-90	5	0.0789	5	0.0897	0.0000	-0.1199	DNC-ED	4
687	ROT	Mid	20-Nov-91	5	0.0821	5	0.0789	0.0000	0.0401	DNC-EI	12
688	ROT	End	20-May-92	5	0.1688	5	0.1617	0.0000	0.0437	DNC-EI	18
689	ROT	End	18-May-93	6	0.3277	5	0.1688	0.2000	0.9417	DI-EI	19
690	ROT	Mid	11-Nov-93	5	0.1860	5	0.1310	0.0000	0.4200	DNC-EI	41
691	ROT	End	25-May-94	10	0.4242	6	0.3292	0.6667	0.2884	DI-EI	59
692	ROT	Mid	15-Nov-94	5	0.1650	5	0.1860	0.0000	-0.1129	DNC-ED	32
693	ROT	End	16-May-95	7	0.2574	10	0.4242	-0.3000	-0.3931	DD-ED	13
694	ROT	Mid	22-Nov-95	5	0.1342	5	0.1650	0.0000	-0.1863	DNC-ED	19
695	ROT	End	20-May-96	7	31.1000	7	25.7000	0.0000	0.2101	DNC-EI	30
696	ROT	Mid	26-Nov-96	4	4.7900	5	13.4200	-0.2000	-0.6431	DD-ED	23
697	ROT	End	11-Jun-97	2	13.7300	7	31.1000	-0.7143	-0.5585	DD-ED	27
698	ROT	End	12-Jun-98	5	23.7400	2	13.7300	1.5000	0.7291	DI-EI	12
699	RPA	End	19-Jun-92	6	0.0997	0	0.0149	∞	5.6875	DI-EI	30
700	RPA	End	25-Jun-93	12.5	0.1402	6	0.0997	1.0833	0.4065	DI-EI	98
701	RPA	Mid	30-Nov-93	6	0.1109	0	0.0724	∞	0.5322	DI-EI	100
702	RPA	End	3-Jun-94	14	0.2688	12.5	0.1402	0.1200	0.9169	DI-EI	86
703	RPA	Mid	25-Nov-94	10	0.1638	6	0.1109	0.6667	0.4776	DI-EI	88
704	RPA	End	19-May-95	15	0.3130	14	0.2688	0.0714	0.1645	DI-EI	79
705	RPA	Mid	17-Nov-95	10	0.1578	10	0.1638	0.0000	-0.0365	DNC-ED	85
706	RPA	End	31-May-96	15	27.7100	15	31.3200	0.0000	-0.1153	DNC-ED	92
707	RPA	Mid	29-Nov-96	10	0.1578	10	0.1640	0.0000	-0.0374	DNC-ED	70
708	RPA	End	30-May-97	5	28.5800	15	27.7100	-0.6667	0.0314	DD-EI	79
709	RPA	Mid	10-Nov-97	7.5	12.8700	10	15.7800	-0.2500	-0.1844	DD-ED	69
710	RPA	End	8-Jun-98	7.5	28.9000	5	28.5800	0.5000	0.0112	DI-EI	58
711	RPA	End	31-May-99	7.5	45.0500	7.5	28.9000	0.0000	0.5588	DNC-EI	41
712	RPA	Mid	19-Nov-99	8.5	13.3300	7.5	15.5800	0.1333	-0.1444	DI-ED	70
713	SAN	Mid	2-May-91	4	0.0998	4	0.0816	0.0000	0.2230	DNC-EI	47
714	SAN	Mid	4-May-92	4	0.2133	4	0.0998	0.0000	1.1383	DNC-EI	94
715	SAN	Mid	5-May-93	4	0.2090	4	0.2133	0.0000	-0.0201	DNC-ED	100
716	SAN	End	5-Nov-93	5	0.3408	5	0.3552	0.0000	-0.0404	DNC-ED	97
717	SAN	Mid	9-May-94	4	0.1940	4	0.2090	0.0000	-0.0719	DNC-ED	93
718	SAN	End	9-Nov-94	6	0.3246	5	0.3408	0.2000	-0.0475	DI-ED	89
719	SAN	Mid	3-May-95	5	0.1731	4	0.1940	0.2500	-0.1077	DI-ED	90
720	SAN	Mid	3-May-96	5	0.1320	5	0.1731	0.0000	-0.2374	DNC-ED	82
721	SAN	Mid	7-May-97	5	7.5500	5	12.0000	0.0000	-0.3708	DNC-ED	93
722	SAN	End	7-Nov-97	6	10.1100	6	25.6700	0.0000	-0.6062	DNC-ED	98
723	SAN	Mid	6-May-98	5	9.0600	5	7.5500	0.0000	0.2000	DNC-EI	83
724	SAN	End	28-Oct-98	7	21.5500	6	18.4000	0.1667	0.1712	DI-EI	95
725	SAN	Mid	6-May-99	7	23.4500	5	9.0600	0.4000	1.5883	DI-EI	99

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
726	SCT	End	8-Oct-98	5.5	13.8600	0	14.1600	∞	-0.0212	DI-ED	98
727	SCT	Mid	9-Apr-99	4.5	6.7700	4.5	5.4900	0.0000	0.2332	DNC-EI	95
728	SCT	End	27-Oct-99	6.5	14.7700	5.5	13.8600	0.1818	0.0657	DI-EI	96
729	SEU	Mid	2-Nov-90	0.75	0.0167	0.5	0.0123	0.5000	0.3575	DI-EI	30
730	SEU	End	4-Jun-91	0.5	0.0246	1	0.0284	-0.5000	-0.1321	DD-ED	28
731	SEU	End	25-May-92	0	-0.0077	0.5	0.0246	-1.0000	-1.3126	DD-ED	81
732	SEU	Mid	4-Nov-92	0.5	0.0185	0	0.0002	∞	100.0000	DI-EI	83
733	SEU	End	28-May-93	1	0.0386	0	-0.0077	∞	6.0130	DI-EI	95
734	SEU	End	1-Jun-94	0	-0.0046	1	0.0386	-1.0000	-1.1196	DD-ED	88
735	SEU	Mid	10-May-95	0.5	0.0192	0.5	-0.0046	0.0000	5.1697	DNC-EI	57
736	SEU	Mid	2-Feb-96	1	0.1040	0.5	0.0062	1.0000	15.7453	DI-EI	87
737	SEU	End	15-Aug-96	2	2.7000	0.75	4.5500	1.6667	-0.4066	DI-ED	93
738	SEU	Mid	31-Jan-97	2	4.1900	1	1.3300	1.0000	2.1504	DI-EI	96
739	SEU	End	30-Jul-97	5	8.4200	2	2.7000	1.5000	2.1185	DI-EI	92
740	SEU	Mid	2-Feb-98	4	5.0900	2	4.1900	1.0000	0.2148	DI-EI	94
741	SEU	End	31-Jul-98	4	9.8200	5	8.4200	-0.2000	0.1663	DD-EI	82
742	SEU	Mid	12-Feb-99	4	5.0500	4	5.0900	0.0000	-0.0079	DNC-ED	94
743	SFH	Mid	21-Jun-96	0.5	-0.0129	0	-0.0027	∞	-3.8542	DI-ED	42
744	SFH	Mid	5-Jun-97	0	0.2000	0.5	-0.3900	-1.0000	1.5128	DD-EI	57
745	SFH	End	15-Dec-97	0	0.9500	0.5	1.0400	-1.0000	-0.0865	DD-ED	49
746	SHP	End	19-Mar-91	2	0.0597	2	0.0532	0.0000	0.1239	DNC-EI	44
747	SHP	Mid	13-Sep-91	0	0.0212	2	0.0224	-1.0000	-0.0522	DD-ED	61
748	SHP	End	30-Mar-92	3	0.0434	2	0.0597	0.5000	-0.2741	DI-ED	82
749	SHP	End	26-Mar-93	0	0.0480	3	0.0434	-1.0000	0.1074	DD-EI	88
750	SHP	End	31-Mar-94	4	0.0482	0	0.0480	∞	0.0029	DI-EI	95
751	SHP	End	8-Mar-95	4.5	0.0435	4	0.0482	0.1250	-0.0961	DI-ED	74
752	SHP	End	12-Mar-96	4.5	0.0437	4.5	0.0435	0.0000	0.0033	DNC-EI	90
753	SHP	End	12-Mar-97	5	6.9000	4.5	5.2600	0.1111	0.3118	DI-EI	83
754	SHP	End	5-Mar-98	5	3.6900	5	5.1800	0.0000	-0.2876	DNC-ED	92
755	SHP	End	10-Mar-99	2.6	5.8300	5	5.9100	-0.4800	-0.0135	DD-ED	99
756	SJL	Mid	11-Nov-94	1	0.0014	1	0.0154	0.0000	-0.9080	DNC-ED	99
757	SJL	End	11-May-95	2	0.0531	4.5	0.0938	-0.5556	-0.4339	DD-ED	96
758	SJL	Mid	4-Dec-95	1	-0.0021	1	0.0014	0.0000	-2.5150	DNC-ED	93
759	SJL	End	17-Jun-96	1	5.1800	2	5.3100	-0.5000	-0.0245	DD-ED	90
760	SJL	Mid	10-Dec-96	1	-2.6700	1	-0.2100	0.0000	-11.7143	DNC-ED	90
761	SJL	Mid	16-Jun-97	0	1.6600	1	5.1800	-1.0000	-0.6795	DD-ED	83
762	SJL	End	17-Aug-99	2.5	7.2300	0	1.5500	∞	3.6645	DI-EI	85
763	SKC	Mid	20-Feb-98	12	16.7700	13	18.2000	-0.0769	-0.0786	DD-ED	98
764	SKC	Mid	22-Feb-99	17	23.0900	12	16.7700	0.4167	0.3769	DI-EI	100
765	SKC	End	12-Aug-99	26	46.8900	17	31.4600	0.5294	0.4905	DI-EI	100
766	SKL	End	11-Aug-94	4	0.1682	0	0.1300	∞	0.2937	DI-EI	100
767	SKL	Mid	9-Feb-95	2.5	0.1988	2.5	0.0758	0.0000	1.6245	DNC-EI	98
768	SOU	Mid	17-Feb-93	1	0.0384	0	0.0411	∞	-0.0663	DI-ED	95
769	SOU	End	18-Aug-93	1	0.0650	0	0.0601	∞	0.0819	DI-EI	98
770	SOU	End	18-Aug-94	3	0.0532	1	0.0650	2.0000	-0.1815	DI-ED	99
771	SOU	Mid	20-Feb-95	1	0.0022	1	0.0217	0.0000	-0.8977	DNC-ED	93
772	SPN	End	11-Sep-95	3.75	0.1430	3.25	0.1410	0.1538	0.0138	DI-EI	87
773	SPN	Mid	26-Feb-96	2.25	0.0240	2.25	0.0540	0.0000	-0.5560	DNC-ED	90
774	SPN	End	6-Sep-96	4	10.4400	3.75	14.3000	0.0667	-0.2699	DI-ED	86
775	SPN	Mid	24-Feb-97	2.25	2.4600	2.25	2.5600	0.0000	-0.0391	DNC-ED	83
776	SPN	End	8-Sep-97	4	9.4700	4	10.4400	0.0000	-0.0929	DNC-ED	85
777	SPN	Mid	27-Feb-98	2.25	3.3300	2.25	2.4600	0.0000	0.3537	DNC-EI	70

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	∆DPS	∆EPS	DPSEPS	Days Traded
778	SPN	End	7-Sep-98	3	8.3100	4	9.4700	-0.2500	-0.1225	DD-ED	54
779	SPN	Mid	22-Feb-99	2	2.0800	2.25	3.3300	-0.1111	-0.3754	DD-ED	67
780	SPN	End	9-Sep-99	3.5	4.3300	3	8.3100	0.1667	-0.4789	DI-ED	64
781	SSB	Mid	12-Dec-90	3	0.0319	3	0.0382	0.0000	-0.1650	DNC-ED	47
782	SSB	Mid	12-Dec-91	3	0.0515	3	0.0319	0.0000	0.6164	DNC-EI	94
783	SSB	End	5-Jun-92	7	0.1679	4.5	0.1602	0.5556	0.0479	DI-EI	96
784	SSB	Mid	10-Dec-92	4	0.1910	3	0.0515	0.3333	2.7091	DI-EI	99
785	SSB	Mid	9-Mar-95	6	0.1202	8	0.2777	-0.2500	-0.5671	DD-ED	100
786	STL	Mid	16-Feb-96	5.67	0.1121	5.46	0.1153	0.0385	-0.0271	DI-ED	94
787	STL	End	16-Aug-96	6.63	13.7700	5.76	7.6000	0.1510	0.8118	DI-EI	94
788	STL	Mid	14-Feb-97	6.03	4.1000	5.67	3.9100	0.0635	0.0486	DI-EI	100
789	STL	End	20-Aug-98	7.77	9.3100	7.4	8.6300	0.0500	0.0788	DI-EI	100
790	STU	End	5-Jun-91	5	0.0964	5	0.1025	0.0000	-0.0592	DNC-ED	54
791	STU	Mid	3-Dec-93	10	0.2002	4	0.1572	1.5000	0.2737	DI-EI	99
792	STU	End	19-Aug-94	15	0.6027	10	0.2828	0.5000	1.1310	DI-EI	84
793	STU	Mid	10-Feb-95	20	0.3290	10	0.2002	1.0000	0.6431	DI-EI	82
794	STU	End	23-Aug-95	20	0.6269	15	0.5110	0.3333	0.2268	DI-EI	93
795	STU	Mid	21-Feb-96	20	0.3018	20	0.3290	0.0000	-0.0827	DNC-ED	100
796	STU	End	21-Aug-96	20	57.9000	20	62.6900	0.0000	-0.0764	DNC-ED	97
797	STU	End	30-Jul-98	7	13.6100	20	44.5600	-0.6500	-0.6946	DD-ED	100
798	STU	End	28-Jul-99	4	11.3100	7	13.6100	-0.4286	-0.1690	DD-ED	100
799	TAS	End	26-Aug-93	1.2	0.4796	3	0.2118	-0.6000	1.2640	DD-EI	94
800	TAS	Mid	25-Feb-94	1.6	0.2367	8	0.2756	-0.8000	-0.1412	DD-ED	97
801	TAS	Mid	21-Feb-95	1.6	0.0325	1.6	0.2367	0.0000	-0.8627	DNC-ED	93
802	TAS	End	4-Aug-95	1.6	0.0545	1.44	0.0739	0.1111	-0.2631	DI-ED	91
803	TAS	Mid	14-Feb-96	1.6	0.0140	1.6	0.0325	0.0000	-0.5680	DNC-ED	99
804	TAS	End	14-Aug-96	1.6	6.1800	1.6	6.3300	0.0000	-0.0237	DNC-ED	91
805	TAS	Mid	14-Feb-97	0	0.1500	1.6	1.4000	-1.0000	-0.8929	DD-ED	95
806	TAS	End	13-Aug-97	1.6	6.5200	1.6	6.1800	0.0000	0.0550	DNC-EI	94
807	TAS	End	10-Aug-98	3	9.1300	1.6	6.5200	0.8750	0.4003	DI-EI	92
808	TAS	End	5-Aug-99	3	6.9600	3	9.1300	0.0000	-0.2377	DNC-ED	85
809	TAY	End	29-Aug-95	2	0.0535	0	0.0084	∞	5.3775	DI-EI	77
810	TAY	Mid	13-Mar-96	2	0.0324	0	0.1101	∞	-0.7055	DI-ED	67
811	TAY	End	4-Sep-96	2	7.9700	2	8.2000	0.0000	-0.0280	DNC-ED	70
812	TAY	Mid	3-Mar-97	2.5	5.0300	2	3.2400	0.2500	0.5525	DI-EI	83
813	TAY	End	10-Sep-97	2	6.1500	2	7.9700	0.0000	-0.2284	DNC-ED	88
814	TAY	Mid	25-Feb-98	2	3.7700	2.5	5.0300	-0.2000	-0.2505	DD-ED	61
815	TAY	End	3-Sep-98	2	5.4200	2	6.1500	0.0000	-0.1187	DNC-ED	67
816	TAY	Mid	15-Feb-99	2	3.9800	2	3.8400	0.0000	0.0365	DNC-EI	73
817	TAY	End	1-Sep-99	2.5	7.4700	2	5.4200	0.2500	0.3782	DI-EI	79
818	TBK	Mid	29-Nov-95	4	0.1004	4	0.0996	0.0000	0.0073	DNC-EI	100
819	TEL	Mid	17-Nov-92	7.25	0.0782	6.5	0.0767	0.1154	0.0203	DI-EI	100
820	TEL	End	18-May-93	8.25	0.0456	6.5	0.1703	0.2692	-0.7323	DI-ED	100
821	TEL	Mid	2-Nov-93	8.25	0.1064	7.25	0.0782	0.1379	0.3604	DI-EI	100
822	TEL	Mid	3-Nov-94	13.5	0.1552	8.25	0.1064	0.6364	0.4583	DI-EI	100
823	TEL	End	12-May-95	16.5	0.3282	14.75	0.2795	0.1186	0.1744	DI-EI	100
824	THL	End	8-Jun-92	3	0.1503	0	0.1193	∞	0.2599	DI-EI	98
825	THL	Mid	17-Nov-92	4	0.0214	3	0.0123	0.3333	0.7367	DI-EI	100
826	THL	End	27-May-93	4	0.2562	3	0.1503	0.3333	0.7049	DI-EI	99
827	THL	Mid	24-Feb-94	5	0.1147	4	0.0214	0.2500	4.3575	DI-EI	100
828	THL	End	15-Sep-94	7	0.2936	4	0.2127	0.7500	0.3805	DI-EI	100
829	THL	End	13-Sep-95	8	0.4033	7	0.2936	0.1429	0.3736	DI-EI	99

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
830	THL	Mid	18-Mar-96	7	0.1114	7	0.1534	0.0000	-0.2737	DNC-ED	59
831	THL	End	12-Sep-96	8	20.2500	8	32.8800	0.0000	-0.3841	DNC-ED	96
832	THL	Mid	12-Mar-97	7	9.3600	7	11.1400	0.0000	-0.1598	DNC-ED	100
833	THL	End	12-Sep-97	0	13.8900	8	20.2500	-1.0000	-0.3141	DD-ED	100
834	THL	Mid	5-Mar-98	0	5.8600	7	9.3600	-1.0000	-0.3739	DD-ED	95
835	TLS	Mid	11-Mar-99	7	14.0700	7	12.5400	0.0000	0.1220	DNC-EI	97
836	TLT	End	28-May-98	5.2	9.3400	0	7.2400	∞	0.2901	DI-EI	100
837	TLT	Mid	12-Nov-98	4.5	9.3400	3.9	7.2400	0.1538	0.2901	DI-EI	100
838	TLT	End	27-May-99	5.2	13.4900	5.2	12.9600	0.0000	0.0409	DNC-EI	100
839	TPW	Mid	15-Nov-95	3.2	0.0622	2.75	0.0421	0.1636	0.4763	DI-EI	98
840	TPW	End	28-May-96	3.09	10.3600	2.52	5.3500	0.2262	0.9364	DI-EI	98
841	TPW	Mid	12-Nov-96	5.86	7.7400	3.2	5.4400	0.8313	0.4228	DI-EI	99
842	TPW	Mid	28-Nov-97	7.28	9.2500	5.86	7.7400	0.2423	0.1951	DI-EI	100
843	TPW	End	29-May-98	7.16	16.2000	5.88	13.0400	0.2177	0.2423	DI-EI	98
844	TPW	Mid	27-Nov-98	9.21	10.0200	7.28	8.6400	0.2651	0.1597	DI-EI	100
845	TPW	End	14-Jun-99	6.95	10.3300	7.16	14.9400	-0.0293	-0.3086	DD-ED	100
846	TPW	Mid	26-Nov-99	8.66	7.6400	9.21	8.8200	-0.0597	-0.1338	DD-ED	100
847	TRH	Mid	30-Jan-98	8.5	16.9500	17	19.0200	-0.5000	-0.1088	DD-ED	94
848	TRH	Mid	5-Feb-99	8.5	10.8800	8.5	16.9500	0.0000	-0.3581	DNC-ED	100
849	TRK	End	15-May-91	12	0.4001	10	0.3632	0.2000	0.1016	DI-EI	39
850	TRK	End	25-May-92	5	0.3112	12	0.4001	-0.5833	-0.2221	DD-ED	59
851	TRK	Mid	19-Nov-92	0	-0.0066	10	0.1469	-1.0000	-1.0451	DD-ED	70
852	TRK	End	1-Jun-93	0	-0.2308	5	0.3112	-1.0000	-1.7414	DD-ED	90
853	TRK	Mid	5-Nov-93	3	0.0530	0	-0.0066	∞	8.9985	DI-EI	80
854	TRK	End	16-May-94	5	0.1446	0	-0.2308	∞	1.6264	DI-EI	71
855	TRK	Mid	17-Nov-94	4	0.0862	3	0.0530	0.3333	0.6265	DI-EI	66
856	TRK	End	18-May-95	10	0.2772	5	0.1446	1.0000	0.9175	DI-EI	35
857	TRK	Mid	13-Nov-95	3	0.0620	4	0.0862	-0.2500	-0.2810	DD-ED	59
858	TRK	Mid	19-Aug-96	3	3.3100	3	2.6400	0.0000	0.2538	DNC-EI	43
859	TTP	Mid	23-Aug-96	2.25	7.3900	0	2.0100	∞	2.6766	DI-EI	100
860	TTP	End	17-Mar-97	2.25	7.7000	2.25	6.2300	0.0000	0.2360	DNC-EI	100
861	TTP	Mid	4-Sep-97	2.25	2.1900	2.25	5.3000	0.0000	-0.5868	DNC-ED	100
862	TTP	End	24-Feb-99	0	5.7500	2.25	5.2900	-1.0000	0.0870	DD-EI	100
863	UBM	Mid	21-Feb-92	7.5	0.2145	5	0.1880	0.5000	0.1411	DI-EI	88
864	UBM	Mid	19-Feb-93	9.5	0.2639	7.5	0.2145	0.2667	0.2303	DI-EI	97
865	UBM	End	20-Aug-93	14.5	0.6002	16	0.5848	-0.0938	0.0263	DD-EI	96
866	UBM	Mid	22-Feb-94	4	0.1766	4	0.2639	0.0000	-0.3306	DNC-ED	100
867	UBM	End	18-Aug-94	6	0.1258	14.5	0.6002	-0.5862	-0.7905	DD-ED	99
868	UBM	Mid	22-Feb-95	4	0.0949	4	0.1766	0.0000	-0.4624	DNC-ED	98
869	UBM	End	10-Aug-95	3.5	0.0911	6	0.1258	-0.4167	-0.2758	DD-ED	89
870	UGF	End	5-Oct-95	3	0.0944	2.5	0.1036	0.2000	-0.0889	DI-ED	38
871	UGF	Mid	4-Apr-96	0	-0.0534	1.5	0.0464	-1.0000	-2.1506	DD-ED	34
872	UGF	End	16-Oct-96	0	-10.6100	3	9.4400	-1.0000	-2.1239	DD-ED	80
873	UNL	End	27-May-96	25.9	32.0900	10	16.0400	1.5900	1.0006	DI-EI	81
874	UNL	Mid	27-Nov-97	11	18.2000	11	18.2400	0.0000	-0.0022	DNC-ED	99
875	UNL	Mid	12-Nov-98	11	12.3200	11	18.2000	0.0000	-0.3231	DNC-ED	97
876	UNL	End	14-Jun-99	19	26.4300	22	42.6900	-0.1364	-0.3809	DD-ED	97
877	WAM	Mid	21-Aug-90	4	0.1068	4	0.1148	0.0000	-0.0702	DNC-ED	38
878	WAM	End	5-Feb-91	6	0.2418	5	0.1711	0.2000	0.4136	DI-EI	14
879	WAM	Mid	23-Aug-91	4	0.1281	4	0.1068	0.0000	0.2003	DNC-EI	44
880	WAM	End	21-Feb-92	6	0.2676	6	0.2418	0.0000	0.1067	DNC-EI	50
881	WAM	Mid	20-Aug-92	4	0.1415	4	0.1281	0.0000	0.1043	DNC-EI	67

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
882	WAM	End	1-Mar-93	6	0.3080	6	0.2728	0.0000	0.1289	DNC-EI	54
883	WAM	Mid	16-Aug-93	4	0.1540	4	0.1415	0.0000	0.0882	DNC-EI	67
884	WAM	End	28-Feb-94	7	0.3364	6	0.3080	0.1667	0.0923	DI-EI	66
885	WAM	Mid	22-Aug-94	4	0.2035	4	0.1540	0.0000	0.3219	DNC-EI	52
886	WAM	End	23-Feb-95	10	0.4239	7	0.3364	0.4286	0.2602	DI-EI	30
887	WAM	Mid	18-Aug-95	7	0.2399	4	0.2035	0.7500	0.1788	DI-EI	55
888	WAM	End	20-Feb-97	4.53	47.9500	11	49.1200	-0.5882	-0.0238	DD-ED	81
889	WAM	Mid	21-Aug-97	3.4	10.1200	8	25.6900	-0.5750	-0.6061	DD-ED	88
890	WAM	End	26-Feb-98	5.8	23.2500	4.53	47.9500	0.2804	-0.5151	DI-ED	86
891	WAM	Mid	20-Aug-98	4	12.0000	3.4	10.1200	0.1765	0.1858	DI-EI	85
892	WAM	End	25-Feb-99	6.8	27.2800	5.8	23.2500	0.1724	0.1733	DI-EI	93
893	WEL	End	22-May-96	0	13.0300	8.25	14.7600	-1.0000	-0.1172	DD-ED	91
894	WHC	End	3-Sep-90	1.5	0.0606	1	0.0123	0.5000	3.9229	DI-EI	42
895	WHC	Mid	25-Feb-91	0.5	0.0452	0	0.0044	∞	9.2727	DI-EI	52
896	WHC	End	5-Aug-91	1.5	0.1083	1.5	0.0606	0.0000	0.7877	DNC-EI	50
897	WHC	Mid	3-Mar-92	0.75	0.0583	5	0.0452	-0.8500	0.2888	DD-EI	77
898	WHC	End	28-Sep-92	1	0.1745	1	0.1083	0.0000	0.6110	DNC-EI	76
899	WHC	End	30-Aug-93	2	0.1749	1.5	0.1793	0.3333	-0.0248	DI-ED	97
900	WHC	Mid	7-Mar-94	3	0.1296	1	0.0818	2.0000	0.5844	DI-EI	100
901	WHC	End	19-Sep-94	4	0.1989	2	0.1749	1.0000	0.1373	DI-EI	99
902	WHC	Mid	6-Mar-95	4	0.1246	3	0.1296	0.3333	-0.0382	DI-ED	98
903	WHC	End	7-Sep-95	6	0.1668	4	0.1989	0.5000	-0.1610	DI-ED	98
904	WHO	Mid	26-Oct-90	6	0.1920	9	0.2517	-0.3333	-0.2371	DD-ED	94
905	WHO	Mid	4-Nov-91	6	0.2067	9	0.2166	-0.3333	-0.0457	DD-ED	96
906	WHO	End	31-May-93	11	0.4216	11	0.4477	0.0000	-0.0582	DNC-ED	100
907	WHO	End	30-May-94	11	0.4223	11	0.4216	0.0000	0.0016	DNC-EI	100
908	WHO	End	31-May-95	11	0.3300	11	0.4215	0.0000	-0.2171	DNC-ED	97
909	WHO	Mid	23-Aug-96	15	18.9800	19	18.9700	-0.2105	0.0005	DD-EI	100
910	WHO	End	28-Feb-97	17	40.7800	10	49.9000	0.7000	-0.1828	DI-ED	98
911	WHO	Mid	19-Aug-97	17	22.1200	15	18.9800	0.1333	0.1654	DI-EI	88
912	WHS	Mid	31-Mar-98	6.5	18.9500	6	17.3700	0.0833	0.0910	DI-EI	99
913	WHS	End	25-Sep-98	7.5	28.0200	4	23.8200	0.8750	0.1763	DI-EI	100
914	WKL	End	30-Sep-94	11	0.3001	14	0.2548	-0.2143	0.1779	DD-EI	59
915	WKL	Mid	27-Mar-95	6	0.1168	7	0.1843	-0.1429	-0.3665	DD-ED	44
916	WKL	End	2-Oct-95	9	0.2117	11	0.3001	-0.1818	-0.2945	DD-ED	61
917	WKL	Mid	1-Apr-96	6	0.1270	6	0.1168	0.0000	0.0876	DNC-EI	69
918	WKL	End	30-Sep-96	9	21.1100	9	21.1700	0.0000	-0.0028	DNC-ED	58
919	WKL	Mid	19-Mar-97	6	9.8400	6	10.4300	0.0000	-0.0566	DNC-ED	66
920	WKL	End	29-Sep-97	9	20.2800	9	21.1100	0.0000	-0.0393	DNC-ED	72
921	WKL	Mid	30-Mar-98	6	5.5600	6	9.8400	0.0000	-0.4350	DNC-ED	62
922	WKL	End	29-Sep-98	6	7.5000	9	20.2800	-0.3333	-0.6302	DD-ED	66
923	WKL	Mid	30-Mar-99	6	7.3200	6	5.5600	0.0000	0.3165	DNC-EI	72
924	WKL	End	17-Sep-99	7	14.3100	6	9.6500	0.1667	0.4829	DI-EI	56
925	WNE	Mid	27-Mar-92	0	-0.0017	2.5	0.0183	-1.0000	-1.0922	DD-ED	94
926	WNG	Mid	7-Feb-95	3	0.0906	3	0.0785	0.0000	0.1536	DNC-EI	94
927	WNG	End	8-Aug-95	7.5	0.2092	5.3	0.1654	0.4151	0.2646	DI-EI	93
928	WNG	Mid	13-Feb-96	3	0.0915	3	0.0906	0.0000	0.0104	DNC-EI	95
929	WRI	Mid	23-Feb-95	3.5	0.0450	0	0.8658	∞	-0.9481	DI-ED	100
930	WRI	Mid	7-Mar-96	3.5	0.0340	3.5	0.0450	0.0000	-0.2444	DNC-ED	99
931	WRI	End	6-Sep-96	7	11.0600	7	14.5300	0.0000	-0.2388	DNC-ED	99
932	WRI	Mid	6-Mar-97	2.5	1.8100	3.5	3.4000	-0.2857	-0.4676	DD-ED	100
933	WRI	End	11-Sep-97	0	8.1000	7	11.0600	-1.0000	-0.2676	DD-ED	100

NO.	COY	INT/FIN	Date	DPS_t	EPS_t	DPS_{t-1}	EPS_{t-1}	ΔDPS	ΔEPS	DPSEPS	Days Traded
934	WRI	Mid	5-Mar-98	2	3.6600	2.5	1.8100	-0.2000	1.0221	DD-EI	100
935	WRI	End	3-Sep-98	1.3	3.9400	0	8.1000	∞	-0.5136	DI-ED	100
936	WRI	End	31-Aug-99	0	-0.7400	1.3	3.9100	-1.0000	-1.1893	DD-ED	100
937	ZNZ	Mid	20-Nov-92	1	0.0281	0	0.0706	∞	-0.6017	DI-ED	72
938	ZNZ	End	11-Jun-93	2	0.0849	1	0.0472	1.0000	0.7994	DI-EI	70
939	ZNZ	Mid	29-Nov-93	1	0.0349	1	0.0281	0.0000	0.2418	DNC-EI	89
940	ZNZ	End	10-Jun-94	2	0.0619	2	0.0849	0.0000	-0.2704	DNC-ED	89
941	ZNZ	Mid	24-Nov-94	1	0.0172	1	0.0349	0.0000	-0.5064	DNC-ED	65
942	ZNZ	End	12-Jun-95	2	0.0289	2	0.0619	0.0000	-0.5341	DNC-ED	68
943	ZNZ	Mid	24-Nov-95	1	-0.0091	1	0.0172	0.0000	-1.5259	DNC-ED	69
944	ZNZ	Mid	29-Nov-96	1	-0.8300	1	-0.8800	0.0000	0.0568	DNC-EI	71
945	ZNZ	End	9-Jun-97	2.5	-0.7300	2.5	0.9800	0.0000	-1.7449	DNC-ED	57
946	ZNZ	Mid	27-Nov-97	1	0.1100	1	-0.8300	0.0000	1.1325	DNC-EI	80
947	ZNZ	End	4-Jun-98	0	-1.0700	2.5	-0.7300	-1.0000	-0.4658	DD-ED	41
948	ZNZ	Mid	12-Nov-98	1	0.4500	1	0.1100	0.0000	3.0909	DNC-EI	40

Appendix D Some Technical Details

Appendix D.1 Software

The following list of software used in the study lists the most recent versions of the software used. Most calculations have been done with the most recent version but sometimes an older version may have been used.

- SAS
- Microsoft Excel 2000.
- Matlab 7, release 14, 6 May 2004.
- The Econometric toolbox by James P. LeSage, Dept of Economics, University of Toledo.
- Scilab 3.1.1, 31 May 2005.
- Grocer 1.041 Copyright Eric Dubois et al. 2002-2005.
- R 2.1.1 was used for cross checking some results.

Appendix D.2 Working with time periods

Allowance must be made for the fact that the days the share market is open for trading do not include weekends or public holidays. This made it necessary to create and maintain an index of trading days. All calculations requiring a specific number of days of observations can then be passed the correct block of data via use of this index. This becomes vital when the required calculation needs to be performed separately on 948 different data sets spread out over a decade. So a common start to Matlab routines used in this study looks like the following 12-line instruction, which marshalled R_{jt} and R_{Mt} observations for each of 948 estimation periods and related test periods:

```
1.  for i=1:948
2.   eventRow = find(eventDates(i)==IndexDates);
3.   startRow = eventRow - estDays -10;
4.   if startRow < 1
5.   continue;
6.   end
7.   if IndexDates(startRow)<FirstDates(eventCos(i))
8.   continue
9.   end
10.  stopRow = eventRow + 10;
11.  x = NZXAllIndex(startRow:stopRow);
12.  y = ReturnIndex(startRow:stopRow,eventCos(i));
```

Line 1 sets up the loop for the code to be repeated for each announcement in the dataset.

Line 2 finds the index of the announcement date.

Lines 3 and 10 calculate the start and stop dates for the entire event period (estimation and test). The variable, ‘estDays’ is the number of days in the estimation period (set at 100) and it is set to finish its count 10 rows before (and clear of) the eventRow

Lines 4 to 9 check that the start date is within the bounds of the collected dataset, and skip to the next event if the start date does not exist in the data set (i.e. has an index value less than 1 — the index’s initial and lowest value on the first trading day of 1990) or if the company did not have a trading record stretching far enough back to cater for that event (i.e., has a start date before ‘FirstDates(eventCos(i))’).

Line 10 establishes that the last observation collected is exactly 10 days after the day of the event.

Lines 11 and 12 then upload the relevant data for company/event '*i*' from the Market Returns and Company Returns indices.

Appendix D.3 Calculating Returns and transferring the Data for Analysis

The Adjusted Closing Share Price data on the IRG CD ROMS have a separate table for each company. The data was extracted by a Visual Basic for Applications (VBA) routine directly from the Microsoft Access database into Microsoft Excel.

Market returns were then calculated in Excel on the all-companies gross index by simple formulas on a spreadsheet, for instance: =LN(B3/B2). Company Returns were calculated by a VBA routine to extract the relevant share price data from a worksheet, and perform a similar function.

Initially, a VBA routine was also employed in Excel to create ARs for all 948 company/event sets. From the output of this, the *t*-tests and *p*-value calculations reported in Chapter 5 were performed in Excel directly. Initially, also, this Excel output was imported into SAS via fixed-length text files for computation of restricted least squares regressions and Kruskal-Wallis tests; but most of this was later redone in Matlab 7. All calculations for Chapters 6 and 7 were performed in Matlab 7 or Scilab 3.1.

Appendix D.4 Performing OLS Regressions

Excel provides a regression facility and the functions 'INTERCEPT' and 'SLOPE'.

In SAS the calculation for OLS is 'proc reg' and it yielded a nice set of statistics.

The easiest way of getting a similar result in Matlab was through using the functions 'regstats', 'regress' and the function 'ols' from the Econometric ToolPak, and then extracting the relevant statistics from each of these, since no single routine provided all the statistics required. It was safer to use this approach since these routines have been tried and tested rather than to write original routines.

Appendix D.5 Calculation of ARs and CARs

Initially the abnormal returns and cumulative abnormal returns were calculated in Excel via simple spreadsheet functions. Later they were recalculated directly in Matlab.

Appendix D.6 Check for Significant Change in Returns on Specific Days in the Test Period

This too was performed in Excel. Note the use of the ‘SUBTOTAL’ function. This was used so that when filters were applied, the values displayed were calculated on the ‘visible’ data only.

Table D-1: Sample spreadsheet and formulas for calculating t-test and p-values for selected data.

	Column W	**Column X**
1	Count	=SUBTOTAL(2,X12:X959)
2	Mean	=SUBTOTAL(1,X12:X959)
3	St Dev	=SUBTOTAL(7,X12:X959)
4	t-test	=X2/(X3/SQRT(X1))
5	p-value	=TDIST(X7,X1-1,2)
6		
7	abs(t-test)	=ABS(X4)

Graphs were created in Excel.

Appendix D.7 ΔEPS and ΔDPS and Associated Dummy Variables

The company announcements were stored by IRG Ltd in Adobe’s “Printer Definition Files” (.PDF). The only way, at the time, of accessing the information, an announcement at a time, was via the custom interface provided by IRG. This interface allowed Microsoft Windows “.CLP” files to be created and stored on floppy disks so that the data could be transferred from the University Library. These files were then read into Microsoft Word, cleaned and organised (via a macro), and announcement data extracted from them onto an Excel worksheet. The change in earnings and change in dividends were simple calculations in an Excel Spreadsheet. The data was checked against hard copy company reports.

Appendix E Tables showing Chapter 5 Results on a One-day Event Window

The regression results in Chapter 5 map the fortunes of the dependent variable, CAR3Day. The following tables furnish the equivalent information on a single-day event window. In each instance, the table is cross-referenced to the CAR3Day table in the body of the chapter. The most important of these is Table E-4 which contains the one-day event window results for the five-dummy RLS regression.

Table E-1 is the one-day equivalent of Table 5-12 on page 136.

Table E-1: Stepwise Regressions on First-order Variables for ARt_0.

Regressand	ARt_0		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
N	865	441	424
Regression with Change in Earnings Only			
(INTERCEPT)	-0.0013	-0.0028	-0.0005
(p-Value)	(0.4648)	(0.2470)	(0.8586)
ΔEPS	0.0017	0.0063	0.0009
(p-Value)	(0.0096)	(0.0001)	(0.2129)
F-Stat	6.7424	14.7160	1.5563
(p-Value)	(0.0096)	(0.0001)	(0.2129)
Adj R^2	0.0066	0.0302	0.0013
Regression with Change in Dividends Only EQUATION (ii)			
(INTERCEPT)	-0.0019	-0.0035	-0.0007
(p-Value)	(0.2840)	(0.1317)	(0.7981)
ΔDPS	0.0017	0.0063	0.0009
(p-Value)	(0.0096)	(0.0001)	(0.2129)
F-Stat	47.5130	45.0140	13.3830
(p-Value)	(0.0000)	(0.0000)	(0.0003)
Adj R^2	0.0511	0.0909	0.0284
Regression with Change in Earnings and Dividend			
(INTERCEPT)	-0.0019	-0.0039	-0.0007
(p-Value)	(0.2759)	(0.0914)	(0.7971)
ΔEPS	0.0006	0.0037	0.0002
(p-Value)	(0.3793)	(0.0227)	(0.7846)
ΔDPS	0.0182	0.0255	0.0130
(p-Value)	(0.0000)	(0.0000)	(0.0006)
F-Stat	24.1370	25.3370	6.7141
(p-Value)	(0.0000)	(0.0000)	(0.0013)
Adj R^2	0.0508	0.0996	0.0263

Table E-2 is equivalent to Table 5-13 on page 137.

Table E-2: RLS Regression with Respect to Earnings Behaviour for ARt_0.

Regressand	ARt_0		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)			
Falling earnings (INTERCEPT)	-0.0073 (0.0038)	-0.0087 (0.0140)	-0.0050 (0.1607)
ΔEPS	0.0003 (0.7138)	0.0028 (0.1102)	0.0000 (0.9779)
ΔDPS	0.0155 (0.0000)	0.0229 (0.0000)	0.0111 (0.0050)
Rising earnings	0.0113 (0.0029)	0.0094 (0.0734)	0.0101 (0.0737)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)			
N	865	441	424
Adj $R^2_{UNRESTRICTED}$	0.0595	0.1042	0.0314
Adj $R^2_{EQUATION\ (ii)}$	0.0508	0.0996	0.0263
Adj $R^2_{EQUATION\ (iii)}$	0.0292	0.0449	0.0167
$F_{UNRESTRRICTED}$	19.2200 (0.0000)	18.0510 (0.0000)	5.5715 (0.0009)
$F_{EQUATION\ (ii)}$	24.1370 (0.0000)	25.3370 (0.0000)	6.7141 (0.0013)
$F_{EQUATION\ (iii)}$	26.9790 (0.0000)	21.6820 (0.0000)	8.1687 (0.0045)
$F_{FIRST\ ORDER}$	14.8978 (0.0000)	15.5237 (0.0000)	4.2003 (0.0156)
$F_{INTERACTION}$	8.9197 (0.0029)	3.2431 (0.0724)	3.1970 (0.0745)

Table E-3 is the equivalent of Table 5-14 on page 140.

Table E-3: Restricted Least Squares regression for change in dividends for ARt_0.

Regressand	ARt_0		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)			
Falling dividends (INTERCEPT)	-0.0108 (0.0075)	-0.0020 (0.7387)	-0.0142 (0.0100)
ΔEPS	0.0005 (0.4253)	0.0037 (0.0271)	0.0002 (0.7977)
ΔDPS	0.0113 (0.0021)	0.0244 (0.0001)	0.0053 (0.2594)
Rising Dividends	0.0174 (0.0037)	0.0013 (0.8835)	0.0239 (0.0053)
DNC	0.0076 (0.1231)	-0.0061 (0.3937)	0.0156 (0.0238)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)			
N	865	441	424
Adj $R^2_{UNRESTRICTED}$	0.0583	0.0998	0.0407
Adj $R^2_{EQUATION\ (ii)}$	0.0508	0.0996	0.0263
Adj $R^2_{EQUATION\ (iii)}$	0.0479	0.0563	0.0417
$F_{UNRESTRRICTED}$	14.3660 (0.0000)	13.2010 (0.0000)	5.4811 (0.0003)
$F_{EQUATION\ (ii)}$	24.1370 (0.0000)	25.3370 (0.0000)	6.7141 (0.0013)
$F_{EQUATION\ (iii)}$	22.7360 (0.0000)	14.1180 (0.0000)	10.2090 (0.0000)
$F_{FIRST\ ORDER}$	5.7429 (0.0033)	11.6198 (0.0000)	0.7554 (0.4704)
$F_{INTERACTION}$	4.3972 (0.0126)	1.0759 (0.3419)	4.1378 (0.0166)

Table E-4 is the equivalent of Table 5-15 on page 142. Its results conform to those on the three-day event window — although more interaction effects are apparently significant in Table E-4's unrestricted estimation with respect to the late subsample. But neither Table 5-15 nor Table E-4 furnish significant interaction *F*-statistics on the early and late subsamples.

Table E-4: Restricted Least Squares regression with dummy variables ARt_0.

Regressand	ARt_0		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)			
DD-ED (INTERCEPT)	-0.0126 (0.0038)	-0.0059 (0.3801)	-0.0143 (0.0156)
ΔEPS	0.0003 (0.6691)	0.0027 (0.1177)	0.0001 (0.8772)
ΔDPS	0.0113 (0.0020)	0.0237 (0.0001)	0.0056 (0.2303)
DI_EI	0.0213 (0.0010)	0.0078 (0.4284)	0.0245 (0.0073)
DD-EI	0.0101 (0.2749)	0.0147 (0.2336)	0.0017 (0.9033)
DI-ED	0.0115 (0.1694)	-0.0005 (0.9615)	0.0193 (0.1419)
DNC-EI	0.0135 (0.0285)	0.0020 (0.8187)	0.0200 (0.0293)
DNC-ED	0.0067 (0.2368)	-0.0059 (0.4845)	0.0138 (0.0802)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)			
N	865	441	424
Adj $R^2_{UNRESTRICTED}$	0.0594	0.1002	0.0347
Adj $R^2_{EQUATION\ (ii)}$	0.0508	0.0996	0.0263
Adj $R^2_{EQUATION\ (iii)}$	0.0499	0.0659	0.0356
$F_{UNRESTRRICTED}$	8.7881 (0.0000)	7.9958 (0.0000)	3.1748 (0.0028)
$F_{EQUATION\ (ii)}$	24.1370 (0.0000)	25.3370 (0.0000)	6.7141 (0.0013)
$F_{EQUATION\ (iii)}$	10.0740 (0.0000)	7.2065 (0.0000)	4.1246 (0.0011)
$F_{FIRST\ ORDER}$	5.3131 (0.0051)	9.2989 (0.0001)	0.8020 (0.4491)
$F_{INTERACTION}$	2.5579 (0.0262)	1.0590 (0.3825)	1.7338 (0.1256)

Appendix F Effect of Foreign Companies in the Dataset.

As mentioned in the discussion of data gathering in Chapter 3, a number of companies listed on the *NZX* are deemed to be foreign companies on the ground that their registered offices are in another country. Joint-announcement observations gathered from these firms have been included in the data analysis. Ten foreign firms contributed 28 observations to the original set of 948 (which included announcements of dividend initiations and resumptions). When dividend initiations and resumptions were deleted, bringing the sample size down to 865, the number of foreign observations was reduced by five to 23. In Table F-1, the full RLS procedure reported in Table 5-14 is repeated with those 23 data-points excluded. (No breakdown into early and late subsamples is provided.)[183]

Table F-1: Restricted Least Squares regression for change in dividends without foreign data points.

RLS Regression on CARs from t = -1 to t = +1 with Respect to Full Interaction between Earnings and Dividend Announcement Components, excluding Observations of foreign-registered Companies: (Dependent Variable: CAR3Day)		
Independent Variable	**Restricted Regression 1**	**Unrestricted Regression**
CONSTANT	-0.00296 (-1.43)	-0.01873 (-3.70)** (p = 0.0002)
DEPS	0.00153 (1.95) (p = 0.0513)	0.00117 (1.48)
DDPS	0.02022 (6.14)** (p < 0.0001)	0.01010 (2.38)* (p = 0.0175)
Dummy 1 (DI-EI)		0.03067 (4.07)** (p < 0.0001)
Dummy 2 (DD-EI)		0.01052 (0.98)
Dummy 3 (DI-ED)		0.01830 (1.85) (p = 0.0647)
Dummy 4 (DNC-EI)		0.01962 (2.72)** (p = 0.0066)
Dummy 5 (DNC-ED)		0.01140 (1.72) (p = 0.0857)
Other Data		
R^2 (Adjusted)	0.0555	0.0703
F-Statistic	25.70** (p < 0.0001)	10.08** (p < 0.0001)
F-Tests covering the Linked Regressions		
F-Statistic, First-Order (DF: 2, 834)		4.727614**
F-Statistic, Interaction (DF: 5, 834)		3.671723**
The intercept of unrestricted regression shows the DD-ED interaction effect. T-values are shown in brackets underneath the value of each coefficient. * indicates that the coefficient is significantly different from zero at the 5% level of error. ** indicates a significant difference from zero at the 1% level of error. The probability of a Type 1 error is shown whenever a coefficient is significantly different from zero up to a 10% level of error. Critical values for the First-order F-statistic were 3.00 (5% error) and 4.61 (1% error). Critical values for the Interaction F-statistic were 2.21 (5% error) and 3.02 (1% error). 842 observations were used in this set of three regressions as 23 announcement-observations of foreign-registered companies have been dropped, reducing the total from 865.		

In Table F-1, the first-order variable, ΔDPS becomes less significant at the five percent level of error, where in Table 5-14 it had been significant at the one percent level. In turn, the first-order

[183] The format of Table F-1 is different from the rest because it is a survival from early in the study, which was not redone when I became aware of the EPS variance problem. It was computed using SAS.

F-statistic has been upgraded in significance from the five percent level to the one percent level. More interestingly, only three of the interaction effects continue to be significant. These are the good-news (DI-EI), bad-news (DD-ED) and mixed-message combination DNC-EI, which are all significant at the one percent level of a Type 1 error. The interaction *F*-statistic remains significant at the one percent level as before. This brings the New Zealand results more closely in line with Easton's (1991) Australian results in terms of interaction effects — albeit the New Zealand results being uniformly more strongly significant than the Australian ones. In terms of first-order effects, however, the results for the two neighbouring countries diverge. Neither of Easton's first-order variables achieved significance; and their associated *F*-statistic was insignificant also. However, with the exception of the lapse into insignificance of the DI-ED interaction, the result reported in this appendix with the dropping of 23 foreign data-points is substantially unchanged from that reported in Table 5-14.

Appendix G Time of Year Analyses

This appendix examines differences between mid-year and end-of-year announcements.

In the method and data chapter it was established that there were no significant differences in the variables ΔDPS and ΔEPS arising from announcement timing — although there was a strong difference in the nature of EPS before and after May 13th 1996. However, the lack of a substantive mid-year versus year-end difference in variables does not rule out the possibility that investors build a timing aspect into their perceptions of the joint dividend-and-earnings signal. In this appendix, we look for differences in event window CARs (CAR3day) between mid-year and year-end announcements.

However, in the current study, the need to preserve an announcement-free interval of 110 days in advance of each usable announcement event forced the removal of first quarter and third quarter disclosures from the data set. Therefore it is beyond the study's scope to go past mid-year and year-end data to observe any effect on CAR3day attributable to quarterly dividend and earnings announcements.

A sequence of Kruskal-Wallis tests was employed to determine if mid-year and year-end abnormal returns were distinguishable from each other, the results of which are reported in Table G-1. Panel A contains records of the following procedures: first, the event window CARs (CAR3day) associated with mid-year and year-end announcements are compared as unpartitioned blocks titled 'Full Sample'. Second, the sample is partitioned into three subsamples each containing one kind of dividend change (ignoring earnings change). Third, the sample is re-partitioned so that the two subsamples of earnings changes (ignoring dividend change) can be observed. And fourth, at the bottom of Panel A are the six subsamples relating to the dividend-change and earnings-change combinations.

It is noteworthy in both panels of Table G-1, that the full sample, undifferentiated by combination of earnings-change and dividend-change, has a high Kruskal-Wallis chi-square statistic which is strongly significant.

Table G-1: Differences in Mid-year and Year-end Observations of CAR3Day.

	ANOVA				KRUSKAL-WALLIS		
	DF Among	DF Within	F-Stat	Pr > F	DF	χ^2 -Stat	Pr > χ^2
Full Sample**	1	865	**15.2210**	**0.0001**	1	**23.2415**	**< 0.0001**
Dividend Increases**	1	306	3.4937	0.0626	1	**8.0124**	**0.0046**
Dividend Decreases**	1	218	2.3548	2.3548	1	3.1750	0.0748
Unchanged Dividend**	1	335	**14.2763**	**0.0002**	1	13.0070	**0.0003**
Earnings Increases*	1	420	2.2175	0.1372	1	**44.9552**	**0.0260**
Earnings Decreases**	1	441	**16.7849**	**< 0.0001**	1	**21.0883**	**< 0.0001**
Only DI-EI *	1	242	2.1126	0.1474	1	**5.3785**	**0.0204**
Only DD-ED	1	180	2.9368	0.0883	1	3.3525	0.0671
Only DD-EI	1	36	0.4867	0.4899	1	0.0116	0.9142
Only DI-ED	1	62	3.7832	0.0563	1	3.6955	0.0546
Only DNC-EI	1	138	0.6584	0.4185	1	0.5297	0.4667
Only DNC-ED*	1	195	**18.8311**	**< 0.0001**	1	**15.9950**	**< 0.0001**

* indicates, with respect to the Kruskal-Wallis Test, less than a 5% probability of a Type 1 error.
** indicates, with respect to the Kruskal-Wallis Test, less than a 1% probability of a Type 1 error.

In Panel A, this distinction (χ^2 = 23.24, p < 0.0001) can be explained with reference to the pattern of results seated further down the same panel. The two results of interest are those for DI-EI announcements and DNC-ED announcements. Investors quite evidently reacted differently in their trading response to mid-year announcements of these two types than to year-end announcements of the same types. The DNC-ED distinction (χ^2 = 16.00, p < 0.0001) is more pronounced than the DI-EI subsample (χ^2 = 5.38, p = 0.0204).

The source of the DNC-ED distinction appears to have its origin in investor reactions to a published drop in earnings. This can be seen, yet elsewhere in Table G-1, in the behaviour of the mean CAR3day value when the sample is differentiated by earnings-change category only. In Table G-2, the mean of CAR3day observations for the 200 mid-year 'Earnings Decrease' announcements was negative 2.93 percent while the 243 year-end 'ED' announcements had a mean of merely one tenth of that magnitude at negative 0.20 percent. This, in turn is reflected in the result of the procedures investigating mid-year and year-end DNC-ED announcements. The mean for the 100 DNC-ED mid-year CAR3day observations was negative 2.65 percent in contrast with the 97 year-end observations' mean of negative 0.55 percent. In other words, the mid-year reaction to an announced earnings decrease was much more dramatic than its end-of-year equivalent.

By contrast, the statistical insignificance of any difference between CAR3day observations associated with mid-year and year-end DNC-EI announcements in Table G-1 would seem to indicate that the DNC component of DNC-EI and DNC-ED announcements is of relatively little interest to investors timing-wise. The fact that the DNC (ignoring earnings-changes) subsample produced a strongly significant distinction (χ^2 = 13.01, p = 0.0003) may reasonably be dismissed as having resulted from the confounding effect of the ED influence buried in the sample and not cancelled out by the presence of EI observations.

With respect to the significance of mid-year and year-end differences in DI-EI CAR3day observations, in Table G-1, a similar audit trail may be followed with respect to means information in Table G-2.

Table G-2: Mid-year and Year-end Mean CARs by Announcement Category.

	Mid-year		Year-end	
CAR3day	**Observation Count**	**Mean**	**Observation Count**	**Mean**
Full Sample	397	-0.0115	468	0.0064
All Dividend Increases	130	0.0109	178	0.0245
Dividend Decreases	91	-0.0347	129	-0.0169
Unchanged Dividends	161	0.0050	176	-0.0161
All Earnings Increases	197	0.0065	225	0.0155
Earnings Decreases	200	-0.0293	243	-0.0020
Only DI-EI	108	0.0140	136	0.0266
Only DD-ED	78	-0.0400	104	-0.0171
Only DD-EI	13	-0.0028	25	-0.0161
Only DI-ED	22	-0.0043	42	0.0178
Only DNC-EI	64	0.0042	76	-0.0026
Only DNC-ED	100	-0.0265	97	0.0055

In Table G-2, the means of observations produced by the subsample of all DI announcements (ignoring earnings changes) were 1.09 percent for the 130 mid-year announcements and 2.45 percent (more than twice as much) for the 178 year-end observations. When the focus is narrowed from all DI announcements to DI-EI observations only, this distinction is heightened. The 108 mid-year DI-EI observations yielded a mean CAR3day value of 1.40 percent in contrast with 2.66 percent for the 136 DI-EI year-end observations. In other words, investors pay more attention to a rise in announced dividends at the end of the company year than they do at the mid-way mark.

On the other hand, the timing in the year of dividend decreases in general is not of strong interest to investors. In Table G-1, mid-year and year-end dividend decreases (ignoring all earnings information) are insignificantly different from each other at the five percent error benchmark level ($\chi^2 = 3.18$, $p = 0.0748$). That is not to say that investors do not worry about dividend decreases — but that their reactions at the mid-year point are indistinguishable from their reactions at the end of the company year.

With respect to running a restricted least squares regression employing the first-order variables, a new dummy variable modelling mid-year announcement status was created, and the five dummy variables modelling direction of change were temporarily dropped. This meant that the intercept term would model year-end announcements.

Table G-3: RLS Regressions with Time-of-company-year Dummy.

Regressand	CAR3Day			ART_0		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)						
End of Year (INTERCEPT)	0.0054 (0.0766)	-0.0023 (0.5996)	0.0110 (0.0061)	0.0039 (0.0992)	0.0013 (0.6902)	0.0056 (0.1086)
ΔEPS	0.0011 (0.1983)	0.0083 (0.0003)	0.0001 (0.8742)	0.0006 (0.3527)	0.0036 (0.0257)	0.0003 (0.7213)
ΔDPS	0.0235 (0.0000)	0.0339 (0.0000)	0.0158 (0.0003)	0.0180 (0.0000)	0.0255 (0.0000)	0.0127 (0.0008)
Mid Year	-0.0177 (0.0001)	-0.0137 (0.0331)	-0.0206 (0.0008)	-0.0127 (0.0003)	-0.0107 (0.0195)	-0.0145 (0.0065)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)						
N	865	441	424	865	441	424
Adj $R^2_{UNRESTRICTED}$	0.0708	0.1244	0.0537	0.0641	0.1088	0.0411
Adj $R^2_{EQUATION\ (ii)}$	0.0550	0.1172	0.0301	0.0508	0.0996	0.0263
Adj $R^2_{EQUATION\ (iii)}$	0.0165	0.0080	0.0250	0.0139	0.0098	0.0157
$F_{UNRESTRRICTED}$	22.9460 (0.0000)	21.8290 (0.0000)	9.0012 (0.0000)	20.7140 (0.0000)	18.8990 (0.0000)	7.0384 (0.0001)
$F_{EQUATION\ (ii)}$	26.1390 (0.0000)	30.2120 (0.0000)	7.5538 (0.0006)	24.1370 (0.0000)	25.3370 (0.0000)	6.7141 (0.0013)
$F_{EQUATION\ (iii)}$	15.4850 (0.0001)	4.5273 (0.0339)	11.8240 (0.0006)	13.1470 (0.0003)	5.3405 (0.0213)	7.7427 (0.0056)
$F_{FIRST\ ORDER}$	26.2268 (0.0000)	30.1748 (0.0000)	7.4006 (0.0007)	24.1635 (0.0000)	25.3837 (0.0000)	6.5963 (0.0015)
$F_{INTERACTION}$	15.6825 (0.0001)	4.5618 (0.0332)	11.5236 (0.0008)	13.1974 (0.0003)	5.5201 (0.0192)	7.4896 (0.0065)

The null hypothesis tested here is:

H_{0A}: The CAR generated during the three-day event window will be associated in a RLS regression with a coefficient for interaction variable modeling mid-year announcements which is indistinguishable from zero at the five percent level of error and/or is not corroborated by an interaction *F*-statistic significantly different from zero at the five percent level of error

The result of this regression procedure is in Table G-3, where H_{0A} is soundly rejected in all six reported procedures.

In Table G-3, ΔEPS is significant in the first half of the decade, but not in the second half; but ΔDPS is strongly significant in all six procedures and validated (again in all six) by strongly significant first-order *F*-statistics. The interaction *F*-statistics of five of the six procedures reported in Table G-3 are also strongly significant, with the exception (early subsample with ARt_0 as regressand) still significant at the five percent level of error. This interaction *F*-statistic corroborates the significance of the mid-year dummy in all six procedures. The end-of-year effect (modelled by the intercept) is significant only with respect to the late subsample when CAR3day is the regressand. Hence hypothesis H_{0B} which is identical to H_{0A} (except for referring to year-end rather than mid-year announcements) can only be rejected on observations prior to May 13th 1996.

Unfortunately, a similar RLS regression employing both dividend-and-earnings interaction dummies and an extra time-of-year dummy did not run properly, hence it was necessary to resort to a less direct method for determining if the direction-of-dividend–and-earnings change categories behaved differently at mid-year from the end of the year. This necessitates a much looser hypothesis test:

H_{0C}: The earnings-and-dividend interaction effects in an RLS procedure on mid-year announcements are indistinguishable from interaction effects in RLS procedures on end-of-year announcements with respect to the level of significance attained by their coefficients and the level of significance of their interaction *F*-statistics.

Table G-4 contains the results of the first RLS procedure for the mid-year and year-end subsamples. The first thing to note is that the first-order variable, ΔDPS is significant at both times of the company year and in all subsamples except the year-end late subsample in column six. Its coefficient in the mid-year unrestricted regression for the early subsample (3.06 percent, $p < 0.0002$) is over twice the magnitude of the early subsample's year-end coefficient (1.35 percent, $p = 0.0118$). The other first-order variable, ΔEPS on the other hand, remains insignificant at both times of the company year except for the early subsample's year-end coefficient. However, the first-order *F*-statistic is strongly significant in all three mid-year cases and in two of the three year-end cases — the exception being the year-end late subsample, where it is insignificant.

The second noteworthy result in Table G-4 is that all three data sets furnish significant earnings interactions effects in the mid-year and not at the end of the year. In the early and late subsamples the rising earnings effect is significant at the five percent level, but the falling earnings effect is significant at the one percent level in all three cases. Further, all three mid-year data sets furnish significant interaction *F*-statistics while the year-end cases do not. In addition, the absolute value of each coefficient at the mid-year is over three times the size of its equivalent at the end of the year. For instance, the early subsample rising earnings coefficient is 2.37 percent while its year-end equivalent is 0.87 percent.

The third noteworthy item is that the R^2 of the unrestricted regression with respect to the early subsample has climbed from 0.1457 to 0.1665. This indicates that the dummy variable representing direction of earnings change this unrestricted regression has improved the explanatory power in the early subsample quite markedly.

Table G-4: RLS Regressions with Earnings Dummies.

Regressand	CAR3Day Mid Year			CAR3Day End of Year		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)						
Falling earnings (INTERCEPT)	-0.0244	-0.0276	-0.0191	0.0023	-0.0068	0.0086
	(0.0000)	(0.0000)	(0.0007)	(0.6290)	(0.3671)	(0.1496)
ΔEPS	0.0000	0.0051	-0.0002	0.0038	0.0078	-0.0028
	(0.9749)	(0.1263)	(0.7879)	(0.1685)	(0.0229)	(0.5754)
ΔDPS	0.0281	0.0306	0.0235	0.0135	0.0288	0.0133
	(0.0000)	(0.0002)	(0.0026)	(0.0118)	(0.0031)	(0.0671)
Rising earnings	0.0244	0.0237	0.0200	0.0070	0.0087	0.0062
	(0.0001)	(0.0134)	(0.0171)	(0.3342)	(0.4294)	(0.5268)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)						
N	397	213	184	468	228	240
Adj $R^2_{UNRESTRICTED}$	0.1362	0.1665	0.1005	0.0355	0.0895	0.0098
Adj $R^2_{EQUATION\ (ii)}$	0.1045	0.1457	0.0766	0.0357	0.0910	0.0123
Adj $R^2_{EQUATION\ (iii)}$	0.0844	0.0991	0.0638	0.0125	0.0326	0.0013
$F_{UNRESTRRICTED}$	21.8140	15.1120	7.8117	6.7353	8.4342	1.7917
	(0.0000)	(0.0000)	(0.0001)	(0.0002)	(0.0000)	(0.1494)
$F_{EQUATION\ (ii)}$	24.1140	19.0820	8.5931	9.6369	12.3580	2.4929
	(0.0000)	(0.0000)	(0.0003)	(0.0001)	(0.0000)	(0.0848)
$F_{EQUATION\ (iii)}$	37.4810	24.3220	13.4690	6.8931	8.6476	1.3076
	(0.0000)	(0.0000)	(0.0003)	(0.0089)	(0.0036)	(0.2540)
$F_{FIRST\ ORDER}$	12.8488	9.5240	4.7078	6.5701	8.0532	2.0201
	(0.0000)	(0.0001)	(0.0102)	(0.0015)	(0.0004)	(0.1349)
$F_{INTERACTION}$	15.4433	6.2225	5.7939	0.9343	0.6107	0.3889
	(0.0001)	(0.0134)	(0.0171)	(0.3342)	(0.4354)	(0.5335)

While not as large, there are similar rises in the other two mid-year samples. However, this is not the case with respect to the year-end output. In the full sample and in both early and late subsamples, the unrestricted equation consistently records a drop in adjusted R^2 relative to the restricted equation labelled Equation (ii). This suggests the earnings announcement direction components at the year-end are relatively unimportant. On this basis, the null hypothesis, H_{0C} is rejected.

The next mid-year and year-end RLS regression procedure employs two dummies to proxy rises and zero change in the dividend component of announcements (ignoring direction of change in the earnings component). In this instance, the intercept term models a fall in the value of the dividend component. The results are presented in Table G-5.

In Table G-5, the clear picture apparent in the last table disappears and it is no longer possible to reject H_{0C}. In the bottom row there is only one significant interaction *F*-statistic — and this is for the full sample of year-end announcement data. Neither the early nor the late subsamples of either time of the year register any dividend interaction effect that can be relied upon. In the case of the year-end full sample, the two dividend interaction effects which achieve significance are the rising dividend and no change in dividend. However, the mid-year late subsample and mid-year full sample did register a significant falling dividend effect unsupported by the necessary interaction F-statistic.

With respect to the first-order variables, the early subsample furnishes significant first-order F-statistics at both mid-year and year-end. But while in the mid-year, both first-order variables are significant, only ΔEPS is significant at the end of the year. The mid-year full sample also achieve a significant first-order F-statistic on the basis of a significant ΔDPS in the related unrestricted regression.

Table G-5: RLS Regressions with Dividend Dummies.

Regressand	CAR3Day Mid Year			CAR3Day End of Year		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)						
Falling dividends (INTERCEPT)	-0.0186 (0.0114)	-0.0146 (0.2068)	-0.0219 (0.0156)	-0.0138 (0.0511)	-0.0208 (0.0925)	-0.0039 (0.6587)
ΔEPS	0.0004 (0.6102)	0.0077 (0.0170)	0.0000 (0.9818)	0.0048 (0.0737)	0.0079 (0.0168)	-0.0002 (0.9658)
ΔDPS	0.0283 (0.0001)	0.0337 (0.0019)	0.0186 (0.0587)	0.0016 (0.8075)	0.0129 (0.3300)	0.0037 (0.6702)
Rising dividends	0.0156 (0.1556)	0.0051 (0.7612)	0.0236 (0.0915)	0.0354 (0.0008)	0.0339 (0.0634)	0.0288 (0.0400)
DNC	0.0024 (0.7751)	-0.0067 (0.6115)	0.0122 (0.2583)	0.0190 (0.0354)	0.0151 (0.3176)	0.0166 (0.1464)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)						
N	397	213	184	468	228	240
Adj $R^2_{UNRESTRICTED}$	0.1073	0.1433	0.0811	0.0547	0.0980	0.0219
Adj $R^2_{EQUATION (ii)}$	0.1045	0.1457	0.0766	0.0357	0.0910	0.0123
Adj $R^2_{EQUATION (iii)}$	0.0755	0.0763	0.0724	0.0501	0.0773	0.0290
$F_{UNRESTRRICTED}$	12.893 (0.0000)	9.8658 (0.0000)	5.0374 (0.0007)	7.7525 (0.0000)	7.1631 (0.0000)	2.3409 (0.0558)
$F_{EQUATION (ii)}$	24.1140 (0.0000)	19.0820 (0.0000)	8.5931 (0.0003)	9.6369 (0.0001)	12.3580 (0.0000)	2.4929 (0.0848)
$F_{EQUATION (iii)}$	17.1590 (0.0000)	9.7611 (0.0001)	8.1458 (0.0004)	13.3060 (0.0000)	10.5080 (0.0000)	4.5753 (0.0112)
$F_{FIRST ORDER}$	8.0241 (0.0004)	9.2081 (0.0001)	1.8535 (0.1597)	2.1398 (0.1188)	3.5831 (0.0294)	0.1422 (0.8675)
$F_{INTERACTION}$	1.5988 (0.2034)	0.7035 (0.4960)	1.4404 (0.2396)	5.6790 (0.0037)	1.8686 (0.1567)	2.1656 (0.1170)

The full five-dummy procedure modelling the directions of combined dividend and earnings change is presented in Table G-6. Items which have behaved much the same way as they did in the full sample (in the Chapter 5) will be discussed first. Then I will move on to the instances of divergent behaviour. I will start by looking at the table's bottom two rows.

In Chapter 5, the late subsample furnished insignificant first-order F-statistic and an insignificant interaction F-statistic when announcement observations were left unsorted by time of the year. In Table G-6, this same behaviour is repeated. This particular data set tells us nothing at all about investors reacting to a dividend signal (or any signal at all) in either the mid-year announcement or the year-end announcement.

Table G-6: RLS Regression with Full Dividend-and-Earnings Interaction Dummies.

Regressand	CAR3Day Mid Year			CAR3Day End of Year		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)						
DD-ED (INTERCEPT)	-0.0241 (0.0017)	-0.0259 (0.0385)	-0.0224 (0.0179)	-0.0129 (0.0983)	-0.0254 (0.0679)	-0.0007 (0.9433)
ΔEPS	0.0000 (0.9962)	0.0045 (0.1874)	-0.0002 (0.8405)	0.0049 (0.0799)	0.0075 (0.0304)	0.0001 (0.9785)
ΔDPS	0.0282 (0.0001)	0.0332 (0.0020)	0.0191 (0.0522)	0.0016 (0.8011)	0.0124 (0.3552)	0.0039 (0.6661)
DI_EI	0.0242 (0.0346)	0.0212 (0.2463)	0.0252 (0.0808)	0.0349 (0.0027)	0.0392 (0.0568)	0.0262 (0.0817)
DD-EI	0.0362 (0.0359)	0.0566 (0.0306)	0.0047 (0.8383)	-0.0042 (0.7902)	0.0173 (0.4566)	-0.0181 (0.4127)
DI-ED	0.0085 (0.5856)	0.0066 (0.7620)	0.0172 (0.4496)	0.0312 (0.0316)	0.0380 (0.0883)	0.0194 (0.3557)
DNC-EI	0.0218 (0.0314)	0.0168 (0.2881)	0.0261 (0.0465)	0.0151 (0.2035)	0.0203 (0.2730)	0.0126 (0.4426)
DNC-ED	-0.0026 (0.7843)	-0.0045 (0.7609)	0.0023 (0.8531)	0.0205 (0.0537)	0.0190 (0.3091)	0.0145 (0.2603)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)						
N	397	213	184	468	228	240
Adj $R^2_{UNRESTRICTED}$	0.1304	0.1620	0.0867	0.0486	0.0880	0.0119
Adj $R^2_{EQUATION\ (ii)}$	0.1045	0.1457	0.0766	0.0357	0.0910	0.0123
Adj $R^2_{EQUATION\ (iii)}$	0.1004	0.1181	0.0772	0.0442	0.0724	0.0187
$F_{UNRESTRRICTED}$	9.4854 (0.0000)	6.8537 (0.0000)	3.4810 (0.0016)	4.4108 (0.0001)	4.1286 (0.0003)	1.4107 (0.2018)
$F_{EQUATION\ (ii)}$	24.1140 (0.0000)	19.0820 (0.0000)	8.5931 (0.0003)	9.6369 (0.0001)	12.3580 (0.0000)	2.4929 (0.0848)
$F_{EQUATION\ (iii)}$	9.8369 (0.0000)	6.6803 (0.0000)	4.0639 (0.0016)	5.3235 (0.0001)	4.5427 (0.0006)	1.9120 (0.0931)
$F_{FIRST\ ORDER}$	7.7469 (0.0005)	6.4139 (0.0020)	1.9191 (0.1498)	2.0657 (0.1279)	2.8960 (0.0574)	0.1949 (0.8231)
$F_{INTERACTION}$	3.3442 (0.0057)	1.8143 (0.1114)	1.3986 (0.2270)	2.2693 (0.0467)	0.8497 (0.5159)	0.9787 (0.4315)

The early subsample hardly furnishes anything more meaningful. At the end of the year, both first-order and interaction *F*-statistics are quite insignificant; and with respect to mid-year announcements, only the first-order *F*-statistic is significant. This gives support to unit change in ΔDPS being associated with a 3.32 percent increase in CAR3day at a one percent level of error. However, the DD-ED and DI-EI interaction effects do register as significant in the unrestricted regression — albeit unsupported by an insignficant interaction *F*-statistic.

The full sample, however, furnishes strongly significant interaction first-order and interaction *F*-statistics for the mid-year and a weaker, but still acceptable interaction *F*-statistic for the end of the year. With respect to the year-end, this significance is based upon positive DI-EI and DI-ED coefficients being significant in the unrestricted equation (in the fourth column of the table). The positive DI-Ed coefficient implies that the influence of the dividend signal is stronger than that of the earnings signal, here.

With respect to the mid-year full sample result in the first column, DD-ED, DI-EI and two mixed-news effects (DD-EI and DNC-EI) feature as significant. This mid-year result provides a very strong corroboration of Kane, Lee and Marcus (1984), Easton (1991) and Lonie, Abeyratna, Power and Sinclair (1996). However we learn more about the influence of an earnings signal here than we do about the influence of a dividend signal. This is because the DD-EI and DNC-EI coefficients are both positive, which implies that the movement in earnings has swamped out the movement in dividend.

The lesson to be drawn from Table G-6 is that the mid-year announcement tells us more about earnings signals and very little about the dividend signal. However, the effect of a dividend signal is much more apparent in the end-of-year-end announcement.

Appendix H Test Period outside the Event Window

The five-dummy restricted least squares procedure of Section 5.4 and formulated in RLS Equation Set Three is now applied to the rest of the CARs in the test period excluding CAR3day. The reason for such an exploration is that the failure to find significant effects outside the event window will strengthen the case for investor reaction to a signal received from the joint dividend and earnings announcement released on day t_0; while the advent of significant results outside the window will weaken the case — unless, that is, a reasonable explanation can be found for them. One such explanation of significant results generated on the nine-days of ARs before the event window would be that there is leakage of information to at least some investors prior to the release of information to the Stock Exchange. If significant results are generated on the nine days of ARs left in the test period after the event window, it might be that the market is not efficient — although this may be indicative of thin trading in which overall demand cannot be matched with overall supply or vice versa.

The nine-day CAR results from t_{-10} to t_{-2} on the full sample are reported in Table H-1. The dependent variable in the restricted least squares procedure is Carprev9day. In this instance, neither of the first-order variables (ΔEPS and ΔDPS), nor the first-order F-statistic are significant on the full sample or late subsample, but ΔEPS is significant at the five percent level on the early subsample. However, the first-order *F*-statistic remains insignificant for all three sets of observations. The full sample furnishes an interaction F-statistic significant at the five percent level of error, which validates three of the interaction coefficients in its unrestricted equation. These are a DD-ED (bad-news) effect significant at the five percent level, and the DI-EI (good-news) and DD-EI (a mixed news dummy) significant at the one percent level of error. The DI-EI coefficient lapses into insignificance in the early subsample; and this subsample does not furnish a significant interaction *F*-statistic. The late subsample furnishes no significant coefficients at all.

From this output we can infer, in terms of the full sample, that there is some evidence of leakage of announcement news in advance. This finding was foreshadowed by the detection of several signficant DI-EI, DD-ED and DD-EI group ARs some days in advance of the event window back in Section 5.2. The finding may be indicative of insider trading activity or, at the very least, of some investors receiving at least some of the relevant information prior to the release of financial information to the *NZX*. It is widely perceived in New Zealand newspapers that insider trading is an ongoing problem which is usually difficult to detect and almost always nearly impossible to prosecute. Nevertheless, there have been a couple of well-publicized prosecutions in the past couple of years. However, any evidence of insider trading in the full sample result is not supported by evidence from the two subsamples.

Table H-1: RLS for CARPrev9Day.

Regressand	CARPrev9Day		
	All Obs.	Early (to 8/5/96)	Late (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)			
DD-ED (INTERCEPT)	-0.0128 (0.0107)	-0.0177 (0.0316)	-0.0068 (0.2860)
ΔEPS	0.0002 (0.7595)	0.0051 (0.0162)	-0.0004 (0.6186)
ΔDPS	-0.0027 (0.5190)	-0.0005 (0.9506)	-0.0035 (0.4943)
DI-EI	0.0199 (0.0074)	0.0234 (0.0528)	0.0106 (0.2852)
DD-EI	0.0296 (0.0052)	0.0314 (0.0378)	0.0250 (0.0965)
DI-ED	0.0125 (0.1938)	0.0181 (0.1844)	0.0062 (0.6607)
DNC-EI	0.0110 (0.1191)	0.0148 (0.1653)	0.0036 (0.7189)
DNC-ED	0.0096 (0.1420)	0.0147 (0.1509)	0.0044 (0.6040)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)			
N	865	441	424
Adj $R^2_{UNRESTRICTED}$	0.0079	0.0315	-0.0076
Adj $R^2_{EQUATION\ (ii)}$	-0.0005	0.0289	-0.0039
Adj $R^2_{EQUATION\ (iii)}$	0.0097	0.0229	-0.0050
$F_{UNRESTRRICTED}$	1.9814 (0.0549)	3.0435 (0.0039)	0.5439 (0.8011)
$F_{EQUATION\ (ii)}$	0.7943 (0.4523)	7.5377 (0.0006)	0.1679 (0.8455)
$F_{EQUATION\ (iii)}$	2.6881 (0.0202)	3.0647 (0.0099)	0.5826 (0.7133)
$F_{FIRST\ ORDER}$	0.2306 (0.7941)	2.9206 (0.0550)	0.4489 (0.6386)
$F_{INTERACTION}$	2.4506 (0.0323)	1.2376 (0.2904)	0.6951 (0.6274)

I will now turn to the equivalent least squares procedure covering the nine days after the event window which is tabulated in Table H-2, where the dependent variable is Carnext9day. Here evidence of any association between the nine-day CAR and the announcement information is even sparser.

Table H-2: RLS for CARNext9Day.

Regressand	CARNext9Day		
	All Obs.	**Early** (to 8/5/96)	**Late** (from 9/5/96)
Coefficients of Unrestricted Regression (p-Values)			
DD-ED (INTERCEPT)	-0.0154 (0.0159)	-0.0271 (0.0148)	-0.0040 (0.5951)
ΔEPS	-0.0001 (0.9315)	0.0016 (0.5702)	-0.0001 (0.9060)
ΔDPS	-0.0068 (0.2062)	0.0065 (0.5185)	-0.0131 (0.0300)
DI-EI	0.0229 (0.0158)	0.0260 (0.1111)	0.0157 (0.1793)
DD-EI	0.0039 (0.7718)	0.0058 (0.7761)	0.0067 (0.7046)
DI-ED	0.0230 (0.0607)	0.0349 (0.0583)	0.0094 (0.5763)
DNC-EI	0.0089 (0.3271)	0.0239 (0.0984)	-0.0081 (0.4900)
DNC-ED	0.0077 (0.3537)	0.0080 (0.5630)	0.0062 (0.5408)
Observations, Adj R^2 Statistics, F-Statistics, (p-Values)			
N	865	441	424
Adj $R^2_{UNRESTRICTED}$	0.0007	0.0192	0.0022
Adj $R^2_{EQUATION\ (ii)}$	-0.0020	0.0180	0.0036
Adj $R^2_{EQUATION\ (iii)}$	0.0011	0.0219	-0.0051
$F_{UNRESTRRICTED}$	1.0889 (0.3682)	2.2334 (0.0307)	1.1355 (0.3396)
$F_{EQUATION\ (ii)}$	0.1336 (0.8750)	5.0287 (0.0069)	1.7740 (0.1709)
$F_{EQUATION\ (iii)}$	1.1842 (0.3150)	2.9734 (0.0119)	0.5670 (0.7253)
$F_{FIRST\ ORDER}$	0.8462 (0.4294)	0.4039 (0.6679)	2.5435 (0.0798)
$F_{INTERACTION}$	1.4704 (0.1970)	1.1120 (0.3532)	0.8809 (0.4937)

While the full sample furnishes significant DD-ED and DI-EI interaction effects in the unrestricted regression, the effects are not corroborated by any significant interaction F-statistic. In fact neither of the subsamples furnish interaction *F*-statistics of any note; and all three sets of observations fail to furnish a significant first-order *F*-statistic. It is clear that there is very little carry-over from the event period.

The procedure, with preceding nine-day CAR (Carprev9day) as its dependent variable, yielded strongly significant positive DI-EI, DD-EI and negative DD-ED interaction coefficients while the procedure processing nine-day CARs following after the event window (Carnext9day) produced significant results. These findings suggest that there is leakage in advance of announcements, but the market adjusts quickly once an announcement has been issued.

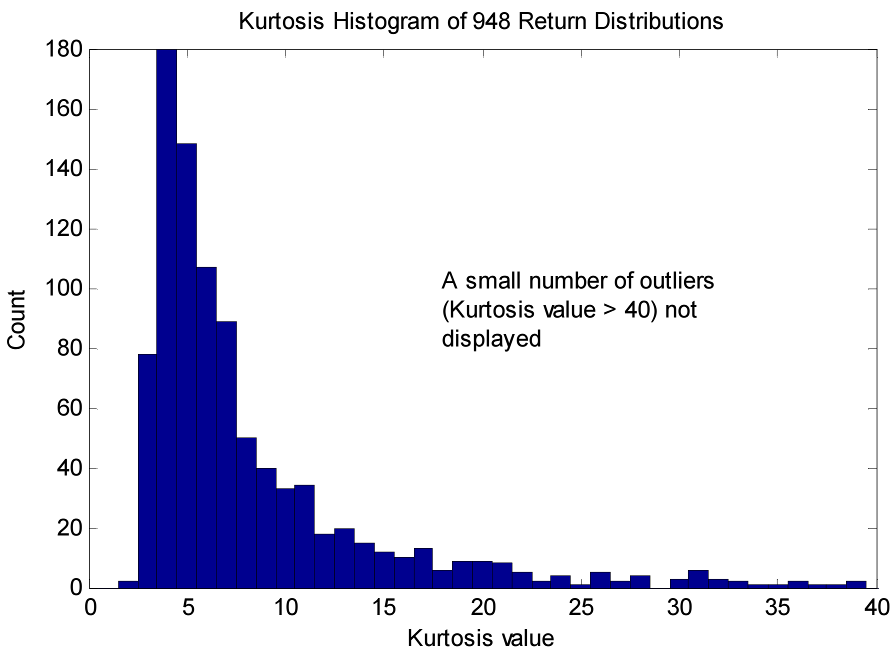
Appendix I Violations of the Normality Assumption

In Chapters 5 and 6, the lack of normality was briefly discussed. In this appendix, further information is provided with respect to employment of the Market Model and RLS regression on the study's 1990s data sets.

Appendix I.1 Further Information about Observed Returns

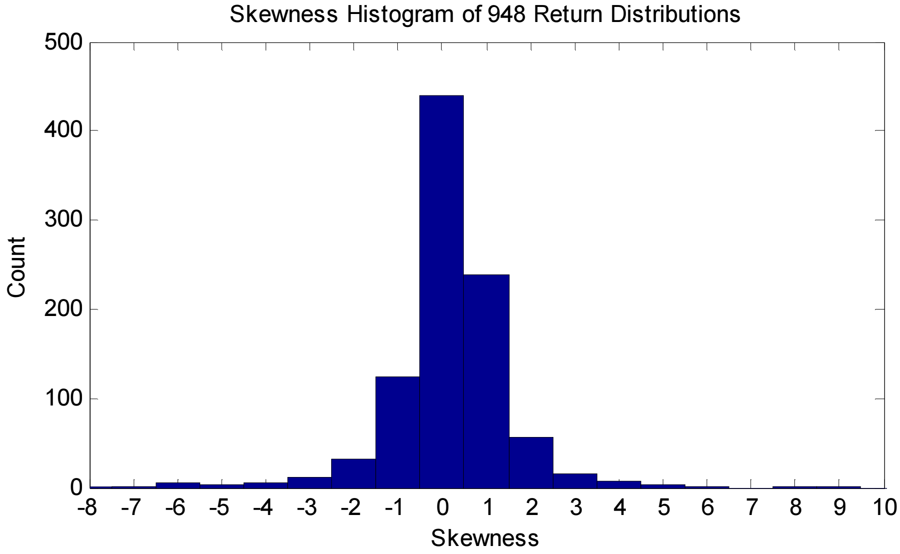
The kurtosis of the 100 log returns from each and every estimation dataset is shown in Figure I-1 with outliers excluded. The horizontal axis contains the kurtosis value while the count of distributions returning each value can be read from the vertical axis. While there is a huge range of kurtosis values across the 948 distributions, the mode value, showing as 4 on the given scale, is actually 3.88. The mean kurtosis however, was 9.25. A leptokurtic probability density function has a higher, narrower peak at the mean than does a normal distribution; and its tails are longer.[184] That distributions of stock returns tend to have a pronounced degree of leptokurtosis was first recorded by Mandelbrot (1963). Fama (1965 and 1976) showed that distributions of daily stock returns tended to have fatter tails than did normal distributions. Both were stating that there was a greater preponderance of outliers in return datasets than allowable in a normal distribution. Roll (1988) ascribed the presence of these outliers as investor reactions to news about or released by firms from time to time on an ongoing basis. It should be remembered that dividend and earnings announcements are not the only news events that have the potential to shift share prices.

Figure I-1: Kurtosis Histogram of 948 Return Distributions.



[184] Gujarati (1995), pp. 769 – 770. Leptokurtosis is present when the value returned by a test for kurtosis is greater than 3. At 3, a distribution is mesokurtic; and below 3, a diagnosis of platykurtosis is furnished. A platykurtic probability density function has a broader, flatter peak than does a normal distribution; and its tails are shorter and (Gujarati says) fatter. By contrast he calls the tails of a leptokurtic distribution long and lean, while Fama (1965) and Dillen and Stolz (1999) emphasise the fatness of leptokurtic tails. One suspects that the word 'fat' is being used in two different ways.

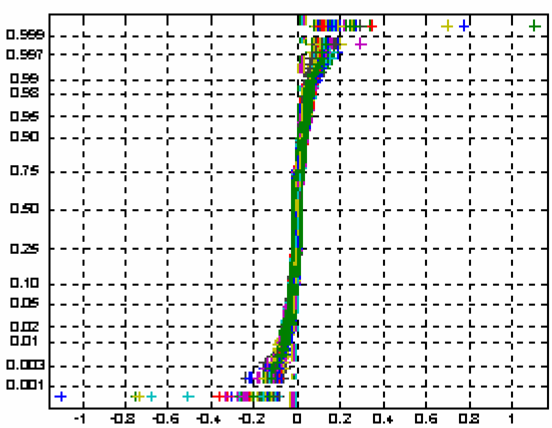
Figure I-2: Skewness Histogram of 948 Return Distributions.



With respect to skewness in Figure I-2, about half of the 948 distributions appear to exhibit zero skewness, which is a necessary feature of a normal distribution. However in Table I-2 the mean turns out to be 0.1776.

With respect to all 948 estimation datasets, each containing 100 daily returns, the 94,800 returns have been recorded in a normal probability plot in Figure I-3. For every 100-return dataset in the figure, a solid straight line is drawn which connects the 25th and 75th percentiles and which is extended out as a dashed line to the first and last percentiles. If the datasets followed normal distributions, all of the observations (registering as "+") would sit very close to, or on top of their associated straight lines. If the + signs diverge into some other pattern, then they are not normally distributed.[185] Here they form a pronounced S-curve.

Figure I-3: Normal Probability Plot of Daily Log Returns (948 x 100 Day Estimation Data Sets).



In Figure I-3 the straight lines are almost vertical. This strongly indicates that half of the datapoints have values either very close to, or exactly zero. This is a further confirmation of the presence of leptokurtosis. This proximity to zero is shown even more clearly when the horizontal axis is trimmed to exclude extreme outliers in Figure I-4.

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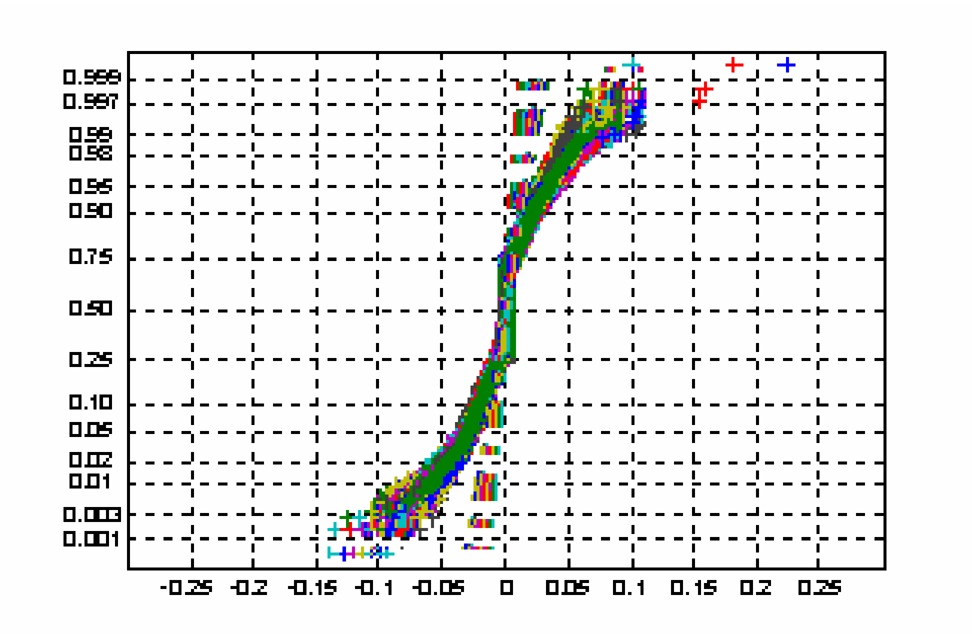
185 MATLAB Statistics Toolbox with respect to Normal Probability Plots and the command h = normplot(X).

Figure I-4: Normal Probability Plot of Daily Log Returns with Horizontal Axis truncated.



The incidence of distributions of daily log returns that were not normal is shown in percentage form in Table I-1. Two normality tests were used, the first of which was the Jarque-Bera test. This is an asymptotic, or large sample test.[186] The second test, the Lilliefors test, is a tool for measuring a sample against the shape of a normal distribution without requiring a mean of zero. While the Jarque-Bera test only works well on large samples, the Lilliefors test performs well on small ones.[187] Employing both tests covered the field. Both were performed with a 5% Type I error level specified. This is the standard level employed throughout the chapter.

Table I-1: Daily Log Return Normality Tests (Full Sample).

Total No. of Data Sets	Percentage (and Count) Not Normal	
	Jarque-BeraTest	LillieforsTest
948	82% (777)	97% (924)

It is clear in Table I-1 that the incidence of data sets that are judged to be not normally distributed by these tests is greater than 80% in every instance. The Jarque-Bera test (based on measures of skewness and kurtosis) furnishes a more conservative result than the Lilliefors test for rejecting normality. In Table I-1 and the next few tables, the sheer number of estimation sets has made reporting of individual procedures impractical — hence the tabulation of percentage summaries.

The means of the kurtosis and skewness figures for various dividend and earnings announcement-related configurations of the dataset are provided in Table I-2. It is clear that the degrees of skewness and kurtosis in the returns in the estimation datasets is quite independent of the types of announcement that follow in the event window.

---

[186] Gujurati (1995), p. 143. The Jarque-Bera test, published by Jarque and Bera (1987) as a paper in volume 55 of the International Statistical Review, operates on a null hyposthesis that the residuals of an OLS regression are normally distributed. The test itself is a joint test of kurtosis and skewness and the JB statistic (STAT in the current study) follows the chi-square distribution with two degrees of freedom.
[187] This point is made in the MATLAB help manual description of the Jarque-Bera test.

Table I-2: Mean Kurtosis and Skewness of Returns (Full Sample).

DPS-EPS	Total	Mean Kurtosis	Mean Skewness
DI-EI	311	9.3667	0.2642
DD-ED	182	9.9224	0.0121
DD-EI	38	8.0643	0.6116
DI-ED	80	9.3296	0.1083
DNC-EI	140	8.2967	0.2006
DNC-ED	197	9.3183	0.1220
TOTAL	948	9.2500	0.1776

When subjected to a Jarque-Bera test, the sample of mean returns from the 948 underlying 100-day Market Model estimation datasets in Table I-3 returned a test value of 32.38 measurable against a critical value of 5.99. This result was confirmed by commensurate Lilliefors tests. Therefore, with reference to the Central Limit Theorem, the cross-sectional convergence of means toward a normal distribution, as recorded by Brown and Warner (1985) has not occurred in the present study.

Each normality test furnishes four statistics. The "H" value can take on either 1 (for non-normality) or 0 (if the distribution is normal). The p-value shows the probability of a Type 1 error, while the "stat" provides the numerical value estimated on the distribution by each test that is measurable against the critical value for a 5% error provided with respect to the test's degrees of freedom. In each instance the calculated statistic surpassed the critical value.

The skewness and kurtosis results in Panel B pertain to the distribution of the 948 observations of log-return means. The skewness in this instance has taken on a small negative value, where earlier it averaged a small positive figure, while the kurtosis of the sample has diminished to 3.88 from 8-10 range apparent in Table I-2.

Table I-3: Distribution of Mean Returns (948 Observations).

Panel A: Tests for Normality on 948 Mean Returns*				
Test	H	p-Value	STAT	Critical Value
Jarque Bera	1	9.3074e-008	32.3797	5.9915
Lilliefors	1	NaN[188]	0.0376	0.0288
Panel B: Other Characteristics relating to the 948 Mean Returns				
Count	948			
Kurtosis	3.8790			
Skewness	-0.1241			

*H = 1 indicates non-normal while H = 0 would have indicated a normal distribution
p-Value is the probability of a Type I error
STAT is the value of the test statistic furnished by each test.
Critical Value has a 5% Type I error probability.

[188] The Lilliefors test p-value registered as "NaN", which stands for "not a number", and which indicates that the test statistic (3.1799e-205) lies outside the range of MATLAB's Lillifors table; but this does not invalidate the test — it merely emphasises the strength of the rejection of the null hypothesis of normality registered in the H-value.

Appendix I.2 Further Characteristics of Residuals from the Market Model Estimation Sets

In histogram form in Figure I-5, the pattern of kurtosis in the 948 Market Model estimation sets, again is almost indistinguishable from that shown on log returns in Figure I-1. Likewise, the distribution of skewness across the sets of residuals in Figure I-6 is virtually indistinguishable from the one on log returns in Figure I-2.

Figure I-5: Histogram of Kurtosis of 948 (100-day) Distributions of Residuals.

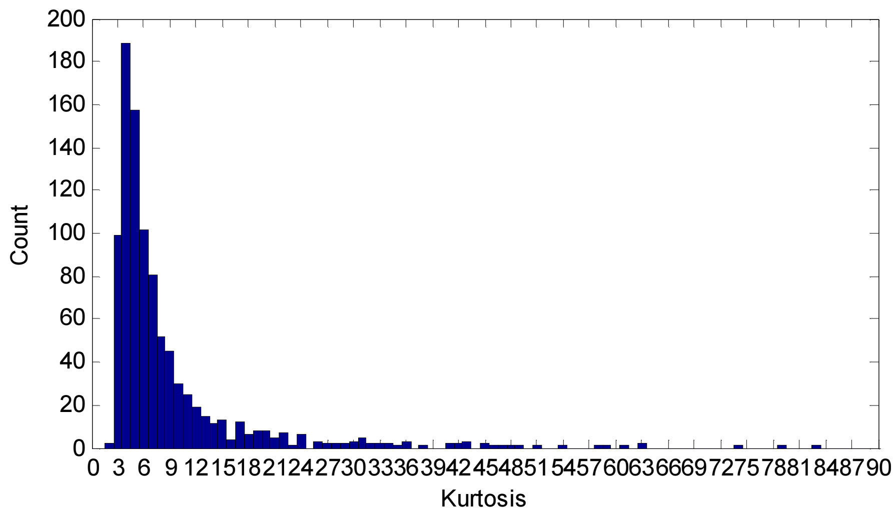
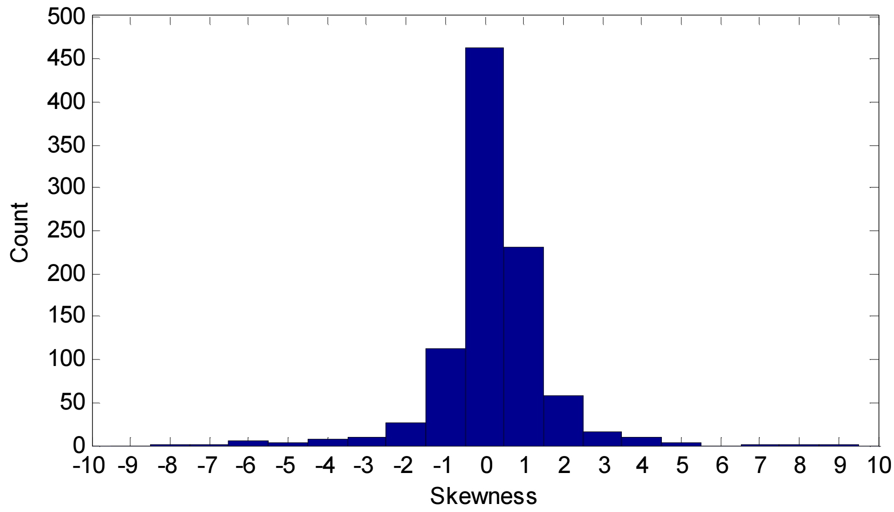
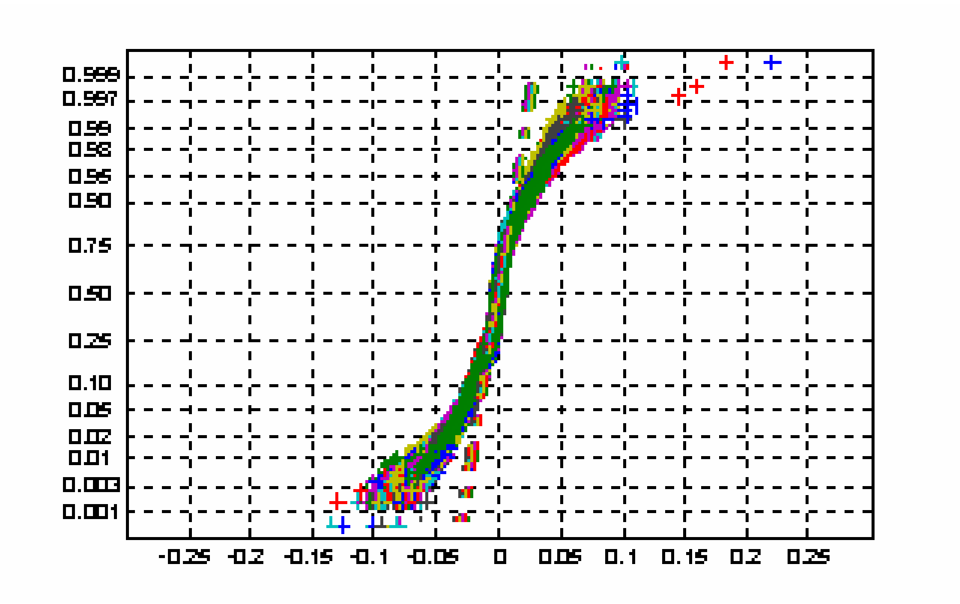


Figure I-6: Histogram of Skewness of 948 (100-day) Distributions of Residuals.



The residuals also behaved in the same manner as the log returns when subjected to a normal probability plot in Figure I-7 in which the horizontal axis has been restricted to ±0.3.

Figure I-7: Normal Probability Plot of 948 sets of Residuals.



Much the same pattern of results emerged in Table I-4 when normality tests were conducted on the residuals to determine if they conformed to the Central Limit Theorem.

Table I-4: Normality Tests on all Standard Market Model OLS Residuals.

Panel A: Tests for Normality				
Test	H	p-Value	STAT	Critical Value
Jarque Bera	1	0	3.3300e+003	5.9915
Lilliefors	1	NaN	0.1205	0.0288
Panel B: Other Sample Characteristics				
Count	948			
Kurtosis	11.9633			
Skewness	-1.0522			

*H = 1 indicates non-normal while H = 0 would have indicated a normal distribution
p-Value is the probability of a Type I error
STAT is the value of the test statistic furnished by each test.
Critical Value has a 5% Type I error probability.

Appendix J Appendices Concerning Friction Models

In these appendices the lines of code has been assigned numbers to aid in the explanation.

Appendix J.1 Comment on Equation (6.5)

In the first argument of Equation(6.5), concerning the log likelihood of the lower zone returns, the final expression is:

$$\left(R_{jt} + \alpha_{Lj} - \beta_j \cdot R_{MT}\right)^2 \tag{1}$$

From Equation (6.1) we know that $R_{jt} = R_{jt}^* - \alpha_{Lj}$. Substituting this into the above expression, we get:

$$\left(R_{jt}^* - \alpha_{Lj} + \alpha_{Lj} - \beta_j \cdot R_{Mt}\right)^2 \tag{2}$$

Further, from Equation (6.1) we know that $R_{jt}^* = \beta_j R_{Mt} + \varepsilon_{jt}$. Substituting this into (2) and gathering terms, we get:

$$\left(\beta_j R_{Mt} - \beta_j R_{Mt} - \alpha_{Lj} + \alpha_{Lj} + \varepsilon_{jt}\right)^2 \tag{3}$$

This leaves us with the squared errors, ε_{jt}^2. The same simplification also reduces the final expression in the third argument of Equation (6.5) to ε_{jt}^2. Further, given in Equation (6.1), that $R_{jt}^* = \beta_j R_{Mt} + \varepsilon_{jt}$, the estimated value of the daily company return, denoted with a hat is simply $\hat{R}_{jt}^* = \beta_j R_{Mt}$.

Appendix J.2 Scilab Code (to_likeFriction3) for determining a Negative Log Likelihood

```
1.  function like = to_likeFriction3(b,y,x);
2.  if isreal(b) & b(4)>0.0001
3.   pi=4*atan(1);
4.   alphal=b(1);
5.   alphau=b(2);
6.   bta = b(3);
7.   sigma = b(4);
8.   like=0;
9.   for i=1:100
10.  bx =bta*x(i);
11.  if y(i)==0
12.  tbl =normcdf((alphau-bx)/sigma)-normcdf((alphal-bx)/sigma);
13.  if tbl~=0
14.  like = like + log(tbl);
15.  end
16.  elseif x(i)>0
17.  like=like+log(1/sqrt(2*pi*sigma^2))-(1/(2*sigma^2))*((y(i)+alphau-bx)^2);
18.  else
19.  like=like+log(1/sqrt(2*pi*sigma^2))-(1/(2*sigma^2))*((y(i)+alphal-bx)^2);
20.  end
21.  end
22.  like=-like;
23.  if ~isreal(like)
```

```
24.  like=1e20
25.  end
26. else
27.  like = 1e20
28. end
29. endfunction
```

Notes:

1. b in Line 1 is a 4x1 vector of parameters while y is the 100x1 vector of R^*_{jt} observations, and x is the 100x1 vector of matching R_{Mt} observations.
2. In Line 2 the condition is imposed that the vector, b must contain real numbers and the fourth item (standard deviation) must be above the arbitrarily chosen minimum positive value stated — which is small and designed to prevent zero or negative standard deviations from entering the procedure and creating a mess downstream.
3. In line 3, the value of π is calculated as the 4 times the arctangent of 1. (Scilab does not supply this value automatically.)
4. Lines 4 to 7 assigns positions for the parameters in vector b. In lines 4 and 5, alphal and alphau are the lower and upper alpha parameters, while Beta is shortened in line 6 to bta as 'beta' has another meaning assigned in Scilab.
5. In line 8, 'like' holds the sum of likelihoods for all points in the 100-observation data set (for all three regions of the friction model). As a likelihood is calculated iteratively for each point (i), 'like' is assigned an initial value of zero. (The code calculates a log likelihood for every observation in the 100-day estimation period data set and sums them up.)
6. In line 10, bx is simply βR_{Mt} for the given beta and the observation (i) where i = *t*.
7. In lines 11 and 12, the zero region data points are processed in accordance with Equation (6.5) once the log instruction in line 14 is taken into account. 'tbl' stands for 'to be logged' and provides an interim result. This is passed to 'like' in line 14. Line 13 is necessary as the log of a number approaching zero approaches infinity. 'log' in Scilab denotes the natural log and the '~' is the negation operator.
8. Lines 16 and 17 operationalize Equation (6.5) instructions for the upper region and adds the result to 'like'. Line 19 does the same for the lower region observations.
9. Lines 20 and 21 end the loop which caters for the required 100 iterations (one for each observation in the estimation period data set)
10. At line 22, the cumulated total log likelihood from 100 observations is defined as a negative log likelihood.
11. In lines 23 to 25, 'isreal(like)' checks whether the output is a real number. Effectively, if the computed likelihood turns out to be an imaginary number, it is removed from contention by being reassigned the huge positive value, 1e20.
12. Lines 26 to 28 perform the same re-assignment, if at line 2 the parameter vector b contains imaginary numbers.

Appendix J.3 Scilab code (normcdf(x)) for determining the Cumulative Normal Density Function

```
function p=normcdf(x)
n=length(x)
[p,q]=cdfnor("PQ",x,zeros(n,1),ones(n,1))
endfunction
```

Notes

The item, cdfnor is a standard Scilab function which can be manipulated to return the cumulative density function. It was presented in a 'wrapper' so that it would work in the same way as a Matlab function of the same name. When Matlab turned out to be less effective than Scilab for computing MLE problems, it was scrapped in favour of Scilab.

Appendix J.4 Scilab Code for determining the Minimum of all Negative Log Likelihoods, the Hessian Matrix and Standard Errors.

```
34. minrng=4;
35.
36. nTooSmall=0;
37. clear tooSmall
38. opt=zeros(948,4);
39. se=opt;
40. fval=zeros(948,1);
41. for i=1:948
42.  disp(i);
43.  eventRow = find(eventDates(i)==IndexDates);
44.  startRow = eventRow - 110;
45.  stopRow = eventRow - 11;
46.  x = NZXAllIndex(startRow:stopRow);
47.  y = ReturnIndex(startRow:stopRow,eventCos(i));
48.  yl = y<0;
49.  yu = y>0;
50.  if sum(yl)<minrng | sum(yu)<minrng;
51.  nTooSmall = nTooSmall + 1;
52.  tooSmall(nTooSmall)=i;
53.  continue;
54.  end;
55.  [fval(i),popt]=optim(list(NDcost,to_likeFriction3, y,x),[-0.1;0.1;2;0.1]);
56.  opt(i,:)=popt';
57.  h=hessian(to_likeFriction3,popt,y,x);
58.  s=sqrt(diag(inv(h)));
59.  if ~isreal(s)
60.  disp "Warning non real se"
61.  end
62.  se(i,:)=s';
63. end
```

Notes:

1. In line 34, 'minrng' stands for 'minumum range'. This was set at 4 observations. There had to be at least 4 observations in each region for the friction model to work.
2. In line 36, 'nTooSmall' is a count of estimation period datasets in which there were too few observations in one of the regions. This function plays a role midway down the coding. The variable 'tooSmall' in line 37 is a repository for data sets that suffer the too-few observations problem. Given that each data set has a number, this number is recorded and the data set does not go on to the MLE step.

3. In lines 38 and 39, ‘opt’ is a 948x4 matrix of zeros, and ‘se’ is a second matrix of the same dimensions.
4. In line 40, ‘fval’ is a vector that will hold the values of the negative log likelihood function at the optimal solution. It starts life as a 948x1 vector of zeros.
5. Lines 41 to 47 marshal estimation period data into vectors x and y. disp(i) puts the estimation period data set number on the computer screen to act as a counter by which the progress of the overall computation of 948 data set results can be monitored.
6. In lines 48 to 52, ‘toosmall’ and ‘nTooSmall’ are calculated. Although observations are assigned to the upper and lower regions of the friction model by the value of the matching x observation (R_{Mt}), the criterion for smallness is actually on the number of observed company return observations (R^*_{jt}) of the theoretically correct sign (i.e., positive for positive) that end up being assigned to each region.
7. In line 53, ‘continue’ acts as a gateway. If there are sufficient observations for the procedure to function properly, the data on dataset (i) is passed onward. But if it turns out to be tagged as ‘tooSmall’ in line 52, ‘continue’ returns to the procedure to the start of the loop to pick up the next (i).
8. In line 55 is the Scilab command for evaluating the negative maximum likelihood function called up from the procedure in Appendix J.1. The function. ‘optim(.)’ creates values to be stored in ‘fval’ and ‘popt’ — which is the vector of optimised parameters. Within this function is the nested function, ‘NDcost’ which returns the gradient calculated from finite differences. This is the tool for the numerical estimation of the global minimum required in the (negative) MLE process. In the words of the Scilab online help library, “This function can be used as an external for **optim** to minimize problem where gradient is too complicated to be programmed. Only the function **fun** which computes the criterion is required. This function should be used as follows: [f,xopt,gopt]=optim(list(NDcost,fun,p1,...pn),x0,...).” The numbers in the square brackets are the starting values for the parameters in the optimisation process. On the left-hand side of the function, ‘popt’ is a vector of the best parameters estimated (‘xopt’ in the help-file).
9. In line 56, ‘opt(i,:) is a matrix of parameters in which each row contains the optimised parameter of a given estimation period data set (i) associated with a particular company announcement event, while the columns contain the parameters by type $(\alpha_L, \alpha_U, \beta, \sigma)$. In line 56, ‘popt’ is loaded into ‘opt’.
10. In line 57, the matrix of second derivatives (hessian matrix) is calculated. Standard errors are calculated by finding the square root of the diagonal of the inverse of the hessian matrix in line 58. The MLE procedure can only be deemed to be successful if the standard errors are real numbers. The presence of an imaginary number (the square root of a negative number) is indicative of a failure to optimise a parameter. The last couple of lines of code collect information on this for diagnostic purposes.

Appendix J.5 RLS Results based on Unconditional Returns generated by the Friction Model on the 100-day Estimation Period

With respect to the RLS regression results employing ARs derived from unconditional expected returns in Table J-1, two quite different stories are told, depending on whether the event window is construed to be a three-day, or a one-day phenomenon. If we interpret the it as a one-day occurrence, both first-order variables, ΔDPS and ΔEPS in the unrestricted equation register a significant association with ARt_0 at or near the one percent level of a Type 1 error on the full data set of 923 company/event observations and on the 712 instances where companies traded on fewer than the full 100 days of the expected return estimation period. The 211 fully-traded firms, however, furnished a connection between ΔDPS and the dependent variable significant at just under the five percent level of error, while ΔEPS dropped into insignificance. These associations are confirmed by strongly significant first-order F-statistics on the full sample and on the more thinly-traded subsample — but no significant association is confirmed for the fully-traded subsample. In addition, the good-news (DI-EI) dummy variable furnishes an association with ARt_0 significant at the five percent level in the unrestricted equation of the full sample and the thinner subsample; but the corresponding interaction F-statistics remain insignificant. The message with respect to the one-day window is that both the dividend announcement and earnings announcement component possibly influence the price of shares traded on the day, but the two cannot easily be distinguished from each other. (Significant interaction variable effects would be necessary to achieve that!) An ancillary message is that the firms which trade every day tend to furnish no evidence of an information effect relating to the disclosure in the one-day event window.

The ancillary message is also clearly apparent when the event window is expanded to three days — the subset of 211 fully-traded firms furnish nothing at all of significance. However, the full sample furnishes a significant interaction F-statistic along with a significant first-order F-statistic. This indicates that the first-order variable, ΔDPS, which registers as significant in the unrestricted procedure is indeed influential.

But more important are the strongly significant good-news and bad-news interaction dummies in the unrestricted procedure with respect to both the full sample and more thinly-traded subsample. (Three of the mixed-news combinations also furnish results significant at the five percent level.) These interaction effects are confirmed in their significance by interaction F-statistics with Type 1 errors of less than one percent. The overall message one can obtain from the association between the announcement variables and the unconditional ARs in a three-day window context is that a dividend signal does appear to be being acted upon. These results are indistinguishable in nature from those obtained in Chapter 5.

Table J-1: Restricted Least Squares Regression using Unconditional Abnormal Returns.

Regressand	CAR3Day			ARt_0		
Sample by Days Traded	All Obs.	100 Days	<100 Days	All Obs.	100 Days	<100 Days
Coefficient (p-Values)						
DD-ED (INTERCEPT)	-0.02031 (0.0012)	-0.014476 (0.1101)	-0.022792 (0.0031)	-0.006968 (0.1365)	-0.007544 (0.2449)	-0.010076 (0.0797)
ΔDPS	0.0015906 (0.0225)	0.0011766 (0.4805)	0.0014585 (0.0633)	0.0024593 (0.0000)	-0.002401 (0.0456)	0.0027618 (0.0000)
ΔEPS	0.0005262 (0.1746)	0.0005527 (0.5302)	0.0005427 (0.2160)	0.0007924 (0.0063)	0.0006913 (0.2740)	0.000798 (0.0151)
DI-EI	0.035997 (0.0000)	0.0083958 (0.4945)	0.044016 (0.0000)	0.014296 (0.0217)	0.013497 (0.1264)	0.018569 (0.0146)
DD-EI	0.0081844 (0.5336)	-0.025218 (0.1350)	0.020943 (0.2083)	0.00358 (0.7154)	-0.023805 (0.0496)	0.014108 (0.2567)
DI-ED	0.025916 (0.0137)	0.011295 (0.4746)	0.03106 (0.0148)	0.0066116 (0.3990)	0.0055451 (0.6243)	0.01177 (0.2157)
DNC-EI	0.021512 (0.0150)	0.01119 (0.3439)	0.025721 (0.0200)	0.0084282 (0.2014)	0.0048209 (0.5692)	0.013173 (0.1105)
DNC-ED	0.010439 (0.1933)	0.0074871 (0.4993)	0.011975 (0.2282)	0.0027466 (0.6466)	0.0029272 (0.7125)	0.0059295 (0.4246)
Observations Count R^2 Statistics, F-Statistics and p-Values						
N	923	211	712	923	211	712
$R^2_{UNRESTRICTED}$	0.0702	0.0490	0.0796	0.0873	0.0518	0.1064
$R^2_{EQUATION\ (ii)}$	0.0467	0.0256	0.0493	0.0801	0.0050	0.0970
$R^2_{EQUATION\ (iii)}$	0.0618	0.0434	0.0721	0.0525	0.0312	0.0655
$F_{UNRESTRRICTED}$	9.8668 (0.0000)	1.4947 (0.1708)	8.702 (0.0000)	12.501 (0.0000)	1.5841 (0.1418)	11.973 (0.0000)
$F_{EQUATION\ (ii)}$	22.558 (0.0000)	2.7309 (0.0675)	18.382 (0.0000)	40.059 (0.0000)	0.52224 (0.5940)	38.085 (0.0000)
$F_{EQUATION\ (iii)}$	12.08 (0.0000)	1.8608 (0.1027)	10.967 (0.0000)	10.164 (0.0000)	1.3186 (0.2574)	9.9045 (0.0000)
$F_{FIRST\ ORDER}$	4.1258 (0.0165)	0.5987 (0.5505)	2.8914 (0.0562)	17.4469 (0.0000)	2.2062 (0.1127)	16.0930 (0.0000)
$F_{INTERACTION}$	4.6108 (0.0004)	1.0000 (0.4188)	4.6394 (0.0004)	1.4415 (0.2068)	2.0033 (0.0796)	1.4773 (0.1950)

Appendix J.6 Configuration of Model with Multiple Independent Variables

In Chapter 6.2 LDV friction models are fitted to day zero abnormal return data and the independent variables, ΔDPS and ΔEPS In addition, a number of extra proxy variables are also included as independent variables. In terms of multiple independent variables, a more compact notation becomes necessary. Let *X* represent a set of independent variables and let Ω bet a set of betas associated with those independent variables. Further, let AR* be the observed abnormal return — which in this case is the AR calculated from the conditional expected return. The model becomes:

$$AR^{*} = X\Omega + \varepsilon$$

Where

$$\begin{cases} AR = AR^{*} - \alpha_L & if \quad AR^{*} \neq 0 \quad and \quad X < 0 \\ AR = 0 & if \quad AR^{*} = 0 \\ AR = AR^{*} - \alpha_U & if \quad AR^{*} \neq 0 \quad and \quad X \geq 0 \end{cases}$$

The likelihood function can then be expressed in the following terms:

$$\begin{aligned} & L\left(\alpha_{Lj}, \alpha_{Uj}, \Omega, \sigma_j \,\middle|\, AR_j, X_j,\right) \\ & = \prod_L \frac{1}{\sigma_j} \phi_L \left[\frac{R_{jt} + \alpha_{Lj} - X_j \Omega}{\sigma_j} \right] \\ & \times \prod_0 \left[\Phi_U \left(\frac{\alpha_{Uj} - X_j \Omega}{\sigma_j} \right) - \Phi_L \left(\frac{\alpha_{Lj} - X_j \Omega}{\sigma_j} \right) \right] \\ & \times \prod_U \frac{1}{\sigma_j} \phi_U \left[\frac{R_{jt} + \alpha_{Uj} - X_j \Omega}{\sigma_j} \right] \end{aligned}$$

The log likelihood function can then be expressed:

$$\begin{aligned} \ln L = & \sum_L \ln \frac{1}{\left(2\pi\sigma_j^2\right)^{1/2}} - \sum_1 \frac{1}{2\sigma_j^2} \left(AR_j + \alpha_{Lj} - X_j \Omega_j \right)^2 \\ & + \sum_0 \ln \left[\Phi_{3j} \left(\frac{\alpha_{Uj} - X_j \Omega_j}{\sigma_j} \right) - \Phi_{1j} \left(\frac{\alpha_{Lj} - X_j \Omega_j}{\sigma_j} \right) \right] \\ & + \sum_U \ln \frac{1}{\left(2\pi\sigma_j^2\right)^{1/2}} - \sum_3 \frac{1}{2\sigma_j^2} \left(AR_j + \alpha_{Uj} - X_j \Omega_j \right)^2 \end{aligned}$$

Note: In the case of the day zero model with two independent variables, the likelihood function is effectively:

$$L\left(\alpha_{Lj},\alpha_{Uj},\beta_{(\Delta DPS)j},\beta_{(EPS)j},\sigma_j \,\middle|\, AR_j,\Delta DPS_j,\Delta EPS_j\right)$$

$$=\prod_L \frac{1}{\sigma_j}\phi_L\left[\frac{R_{jt}+\alpha_{Lj}-\beta_{(\Delta DPS)j}\Delta DPS_j-\beta_{(\Delta EPS)j}\Delta EPS_j}{\sigma_j}\right]$$

$$\times\prod_0\left[\Phi_U\left(\frac{\alpha_{Uj}-\beta_{(\Delta DPS)j}\Delta DPS_j-\beta_{(\Delta EPS)j}\Delta EPS_j}{\sigma_j}\right)-\Phi_L\left(\frac{\alpha_{Lj}-\beta_{(\Delta DPS)j}\Delta DPS_j-\beta_{(\Delta EPS)j}\Delta EPS_j}{\sigma_j}\right)\right]$$

$$\times\prod_U \frac{1}{\sigma_j}\phi_U\left[\frac{R_{jt}+\alpha_{Uj}-\beta_{(\Delta DPS)j}\Delta DPS_j-\beta_{(\Delta EPS)j}\Delta EPS_j}{\sigma_j}\right]$$

Appendix J.7 Code for Day Zero Friction Model

The code in this section produced the day zero LDV friction model with two independent variables. The code for producing the model with two interaction variables is in Appendix J.9.

Code: PCI_P.sce

```
e=ea(opt(:,3)~=0);
d=da(opt(:,3)~=0);
ar0=arc0(opt(:,3)~=0);

ep=e(d>=0 & e>0);
dp=d(d>=0 & e>0);
ar0p=ar0(d>=0 & e>0);
dtp=dta(d>=0 & e>0);

en=e(d<=0 & e<0);
dn=d(d<=0 & e<0);
ar0n=ar0(d<=0 & e<0);
dtn=dta(d<=0 & e<0);

eb = [ep;en];
db = [dp;dn];
ar0b=[ar0p;ar0n];
dtb=[dtp'; dtn'];

//eb=eb(dtb==100);
//db=db(dtb==100);
//ar0b=ar0b(dtb==100);

[f,popt]=optim(list(NDcost,to_like, ar0b,db,eb),[-0.1;0.1;0.1;0.1;0.1]);
h=hessian(to_like,popt,ar0b,db,eb) ;
hi=inv(h);
s=sqrt(diag(hi));

alpha=0.05;
probs=[alpha/2;1-alpha/2];
p = repmat(probs,1,length(popt));
q=1-p;
pci=cdfnor("X",[popt'; popt'], [s'; s'],p,q)'
n=length(eb)
disp(n)
disp([pci(:,1) popt pci(:,2)])
[pv,qv]=cdfnor("PQ",abs(popt),zeros(5,1),s);
//[pv,qv]=cdfchi("PQ",abs(popt),[n-6;n-6;n-6;n-6;n-6])
mprintf('%f\n',qv)
```

Code: to_like.sci

```
function like = to_like(b,y,xD,xE);
if isreal(b) & b(5)>0.0001
 pi=4*atan(1);
 //3.14159265358979;
 alphal=b(1);
 alphau=b(2);
 btaD = b(3);
 btaE = b(4)
 sigma = b(5);

 like=0;
 for i=1:length(xD)
 bxD =btaD*xD(i);
 bxE =btaE*xE(i);
 if y(i)==0
 tbl =normcdf((alphau-bxD-bxE)/sigma)-normcdf((alphal-bxD-bxE)/sigma);
 if tbl~=0
 like = like + log(tbl);
// else
// like = 1e20;
// break;
 end
 elseif xE(i) > 0
 like=like+log(1/sqrt(2*pi*sigma^2))-(1/(2*sigma^2))*((y(i)+alphau-bxD-bxE)^2);
 else
 like=like+log(1/sqrt(2*pi*sigma^2))-(1/(2*sigma^2))*((y(i)+alphal-bxD-bxE)^2);
 end
 end
 like=-like;
 if ~isreal(like)
 like=1e20
 end
else
 like = 1e20
end
endfunction
```

Appendix J.8 Code for Day Zero Friction Model partitioned into Deciles by Company Market Capitalisation

File: PCI_Pd.sce

```
e=ea(opt(:,3)~=0);
d=da(opt(:,3)~=0);
ar0=arc0(opt(:,3)~=0);
mda=mktcapdec(opt(:,3)~=0);
dt=dta(opt(:,3)~=0);

ep=e(d>=0 & e>0);
dp=d(d>=0 & e>0);
ar0p=ar0(d>=0 & e>0);
dtp=dt(d>=0 & e>0);
mdp=mda(d>=0 & e>0);

en=e(d<=0 & e<0);
dn=d(d<=0 & e<0);
ar0n=ar0(d<=0 & e<0);
dtn=dt(d<=0 & e<0);
mdn=mda(d<=0 & e<0);

eb = [ep;en];
db = [dp;dn];
```

```
ar0b=[ar0p;ar0n];
dtb=[dtp'; dtn'];
mdb=[mdp;mdn];

for k=1:10
 disp(k)
 ebt=eb(mdb==k);
 dbt=db(mdb==k);
 ar0bt=ar0b(mdb==k);

 [f,popt]=optim(list(NDcost,to_like, ar0bt,dbt,ebt),[-0.1;0.1;0.1;0.1;0.1]);
 h=hessian(to_like,popt,ar0bt,dbt,ebt) ;
 hi=inv(h);
 s=sqrt(diag(hi));
 optd(k,:)=popt';
 fd(k)=f;
 sd(k,:)=s'

 alpha=0.05;
 probs=[alpha/2;1-alpha/2];
 p = repmat(probs,1,length(popt));
 q=1-p;
 pci=cdfnor("X",[popt'; popt'], [s'; s'],p,q)'
 n=length(ebt)
 disp(n)
 disp([pci(:,1) popt pci(:,2)])
 [pv,qv]=cdfnor("PQ",abs(popt),zeros(5,1),s);
 //[pv,qv]=cdfchi("PQ",abs(popt),[n-6;n-6;n-6;n-6;n-6])
 mprintf('%f\n',qv)
end
```

This procedure calls up to_like.sci, the code for which is in Appendix J.7.

Appendix J.9 Code for Day Zero Friction Model with Interaction Variables

Code: PCI_Pdummies.sce

```
e=ea(opt(:,3)~=0);
d=da(opt(:,3)~=0);
ar0=arc(opt(:,3)~=0,11);
dpseps=ddps_deps_dpseps(opt(:,3)~=0,3);
len=length(e);
dc=zeros(len,1);
dnc=zeros(len,1);

dc(dpseps==1)=1;
dc(dpseps==2)=-1;
dnc(dpseps==5)=1;
dnc(dpseps==6)=-1;

ep=e(d>=0 & e>0);
dp=d(d>=0 & e>0);
ar0p=ar0(d>=0 & e>0);
dcp=dc(d>=0 & e>0);
dncp=dnc(d>=0 & e>0);

en=e(d<=0 & e<0);
dn=d(d<=0 & e<0);
ar0n=ar0(d<=0 & e<0);
dcn=dc(d<=0 & e<0);
dncn=dc(d<=0 & e<0);

eb = [ep;en];
db = [dp;dn];
ar0b=[ar0p;ar0n];
```

```
dcb=[dcp;dcn];
dncb=[dncp;dncn];

[f,popt]=optim(list(NDcost,to_like2, ar0b,db,eb,dcb,dncb),[-0.1;0.1;0.1;0.1;0.1;0.1;0.1],iter=1000);
h=hessian(to_like2,popt,ar0b,db,eb,dcb,dncb) ;
hi=inv(h);
s=sqrt(diag(hi));

alpha=0.05;
probs=[alpha/2;1-alpha/2];
p = repmat(probs,1,length(popt));
q=1-p;
pci=cdfnor("X",[popt'; popt'], [s'; s'],p,q)'
n=length(eb)
disp(n)
disp([pci(:,1) popt pci(:,2)])
[pv,qv]=cdfnor("PQ",abs(popt),zeros(7,1),s);
//[pv,qv]=cdfchi("PQ",abs(popt),[n-6;n-6;n-6;n-6;n-6])
mprintf('%f\n',qv)
```

Code: to_like2.sci

```
function like = to_like2(b,y,xD,xE,xDC,xDNC);
if isreal(b) & b(7)>0.0001
 pi=4*atan(1);
 //3.14159265358979;
 alphal=b(1);
 alphau=b(2);
 btaD = b(3);
 btaE = b(4);
 btaDC=b(5);
 btaDNC=b(6);
 sigma = b(7);

 like=0;
 for i=1:length(xD)
 bxD =btaD*xD(i);
 bxE =btaE*xE(i);
 bxDC=btaDC*xDC(i);
 bxDNC=btaDNC*xDNC(i);
 if y(i)==0
 tbl =normcdf((alphau-bxD-bxE-bxDC-bxDNC)/sigma)-normcdf((alphal-bxD-bxE-bxDC-bxDNC)/sigma);
 if tbl~=0
 like = like + log(tbl);
 end
 elseif xE(i) > 0
 like=like+log(1/sqrt(2*pi*sigma^2))-(1/(2*sigma^2))*((y(i)+alphau-bxD-bxE-bxDC-bxDNC)^2);
 else
 like=like+log(1/sqrt(2*pi*sigma^2))-(1/(2*sigma^2))*((y(i)+alphal-bxD-bxE-bxDC-bxDNC)^2);
 end
 end
 like=-like;
 if ~isreal(like)
 like=1e20
 end
else
 like = 1e20
end
endfunction
```

Appendix K Further Explorations of Conditional Abnormal Returns and both ΔEPS and ΔEPS

With respect to friction models, we have so far only observed what happens when all one-day event window observations are processed as one undifferentiated sample. What happens if one distinguishes between announcements in terms of the announcement-making firms' thinness of trading (as measured in the estimation period) and by company market capitalisation? Is there any difference between the day t_0 effects of mid-year and end-of year announcements? Further, is there any distinction in behaviour between day t_0 and the surrounding days in the rest of the test period? These issues are explored here.

Appendix K.1 Trading Thinness

In Table K-1, the data set is cut down so that it includes only company/events associated with estimation periods in which the company's shares traded every day. These company/events show much less responsiveness to ΔDPS and to ΔEPS. In fact, for these firms, the price response to a dividend signal lapses into insignificance as measured by the $\beta_{\Delta DPS}$ *p*-value.

Table K-1: Equation (6.11) Model on Day Zero restricted to Shares traded on all available Days.

Parameter	MLE	95% Conf. Int Lower Bound	95% Conf. Int Upper Bound	p-Values
α_L	-0.0246	-0.0319	-0.0173	0.0000
α_L	0.0075	0.0008	0.0143	0.0143
$\beta_{\Delta DPS}$	0.0011	-0.0016	0.0037	0.2145
$\beta_{\Delta EPS}$	0.0015	-0.0001	0.0030	0.0297
σ	0.0357	0.0317	0.0398	0.0000
185 observations based on DAYSTRADED = 100 (DD-EI and DI-ED excluded)				

The earnings response is also muted down, but is still significant at the five percent level of error. This finding agrees with the RLS regression results reported in Chapter 5 Section 5.6, where they are partitioned into results for fully-traded firms and for firms that have not had their share traded every day of the 100-day estimation period used for expected returns calculation. Generally, firms that have their shares traded on all 100 days furnish insignificant results.

But when these 185 observations are excluded from the data set and the model is run on the remaining 622 observations of company/event whose associated shares traded with varying degrees of thinness (from 99 days active trading down to less than 20), the pattern observed in Table 6-9 re-emerges. The results for this analysis are in Table K-2. All of the parameters are again strongly significant; and the beta for ΔDPS is again more than four times the size the beta for ΔEPS.

Table K-2: Equation (6.11) Model on Day Zero restricted to Shares traded on less than all Available Days.

Parameter	MLE	95% Conf. Int Lower Bound	95% Conf. Int Upper Bound	p-Values
α_L	-0.0630	-0.0723	-0.0537	0.0000
α_L	0.0315	0.0233	0.0397	0.0000
$\beta_{\Delta DPS}$	0.0060	0.0046	0.0074	0.0000
$\beta_{\Delta EPS}$	0.0018	0.0010	0.0027	0.0000
σ	0.0764	0.0712	0.0816	0.0000
622 observations based on DAYSTRADED < 100 (DD-EI and DI-ED excluded)				

It is clear, as in the earlier RLS regression material, that well-traded shares are more efficiently priced (in terms of the efficient market hypothesis), and that less well-traded shares are more prone to yielding ARs when a company announcement is made. This is not new news to the discipline of Finance; but it has been determined here, in a joint dividend and earnings announcement event context, in a new way.

Appendix K.2 The Size Effect

The original 948 company/event sets were partitioned by company market capitalisation, where members of the 10th decile were the largest companies. With the reduction of the sample size from 948 down to 807 observations, the original equally-sized deciles have become a little uneven. The parameter estimates and their associated *p*-values are furnished for each decile in Table K-3.

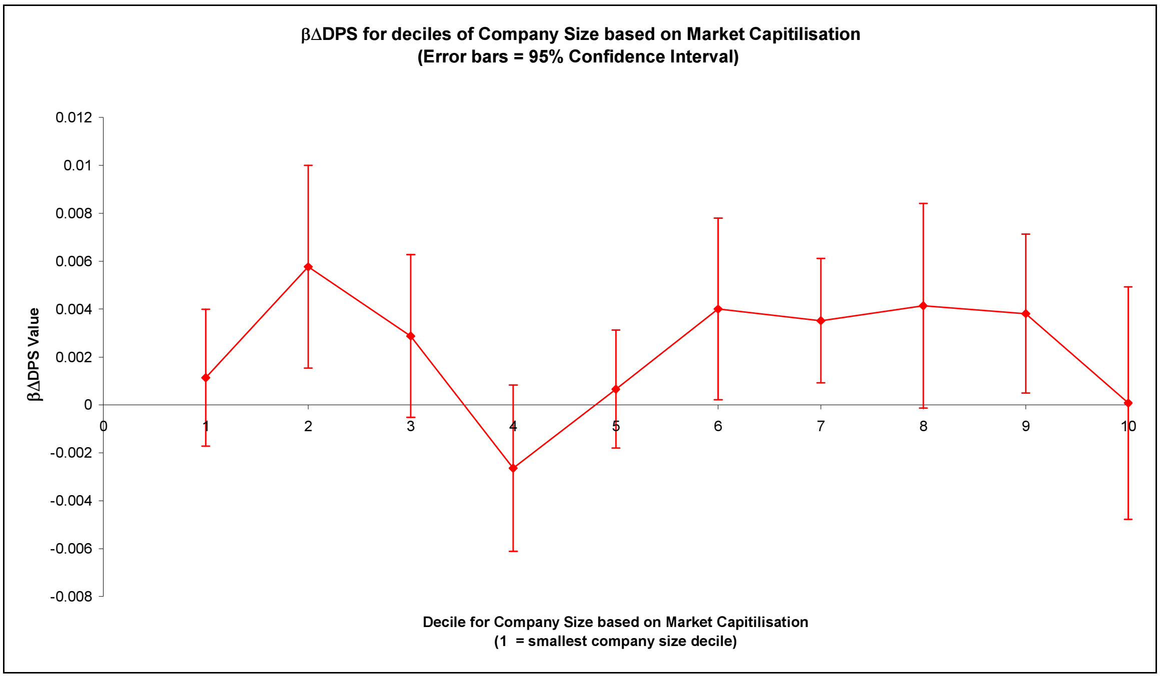
Table K-3: MLE Parameter Estimates on Day Zero by Market Capitalisation Decile.

Decile	N	α_L	α_U	$\beta_{\Delta DPS}$	$\beta_{\Delta EPS}$	σ
10	85	-0.0158 (0.0000)	0.0072 (0.0065)	0.0001 (0.4882)	0.0005 (0.3698	0.0195 (0.0000)
9	78	-0.0243 (0.0000)	0.0132 (0.0007)	0.0038 (0.0123)	0.0008 (0.1779)	0.0232 (0.0000)
8	75	-0.0231 (0.0000)	0.0192 (0.0000)	0.0042 (0.0278)	0.0040 (0.0007)	0.0237 (0.0000)
7	84	-0.0395 (0.0000)	0.0159 (0.0004)	0.0035 (0.0041)	0.0029 (0.0158)	0.02722 (0.0000)
6	85	-0.0458 (0.0000)	0.0104 (0.0274)	0.0040 (0.0193)	0.0002 (0.3828)	0.0337 (0.0000)
5	82	-0.0373 (0.0000)	0.0153 (0.0005)	0.0006 (0.3205)	0.0017 (0.0544)	0.0276 (0.0000)
4	83	-0.0694 (0.0000)	0.0276 (0.0048)	-0.0026 (0.0678)	0.0018 (0.0040)	0.0671 (0.0000)
3	82	-0.0388 (0.0000)	0.0225 (0.0002)	0.0029 (0.0483)	-0.0010 (0.1732)	0.0325 (0.0000)
2	89	-0.0648 (0.0000)	0.0383 (0.0000)	0.0058 (0.0034)	0.0014 (0.0149)	0.0438 (0.0000)
1	64	-0.1666 (0.0000)	0.0927 (0.0005)	0.0013 (0.1984)	0.0018 (0.0614)	0.0998 (0.0000)
Total	807					

In each cell, the upper figure is the MLE parameter estimate and the lower figure in brackets is the associated *p*-value.

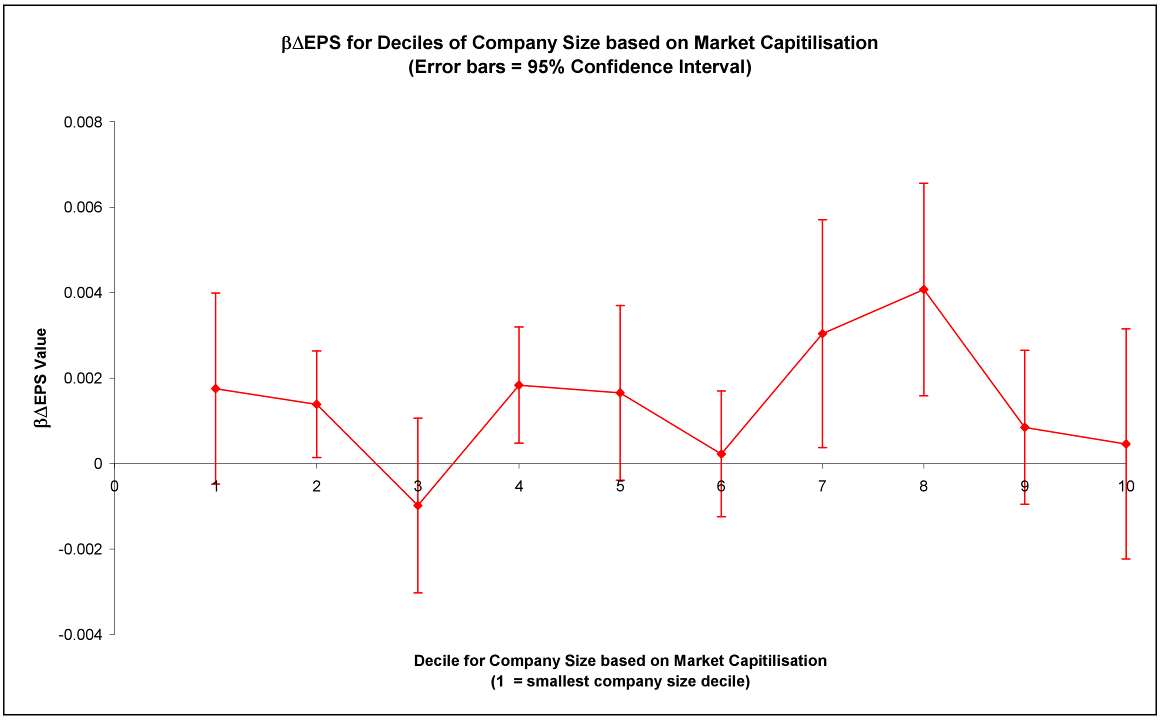
With respect to the beta parameters associated with company size deciles, there is no immediately clear pattern — as some of them are significant and others of them are not; and they vary in magnitude, as can be seen in Figure K-1. But one should not be hasty in dismissing size-based beta effects. The top decile has an insignificant beta parameter that is very close to zero while those of all other deciles are further away. The miniscule beta associated with the top decile is indicative of a relative lack of a dividend signalling effect vis-à-vis the other deciles. However, there is no immediately plausible explanation as to why the beta for the 4th decile should be negative while all others are positive. However, it is insignificant.

Figure K-1: Day Zero ΔDPS Coefficients by Deciles of Market Capitalisation.



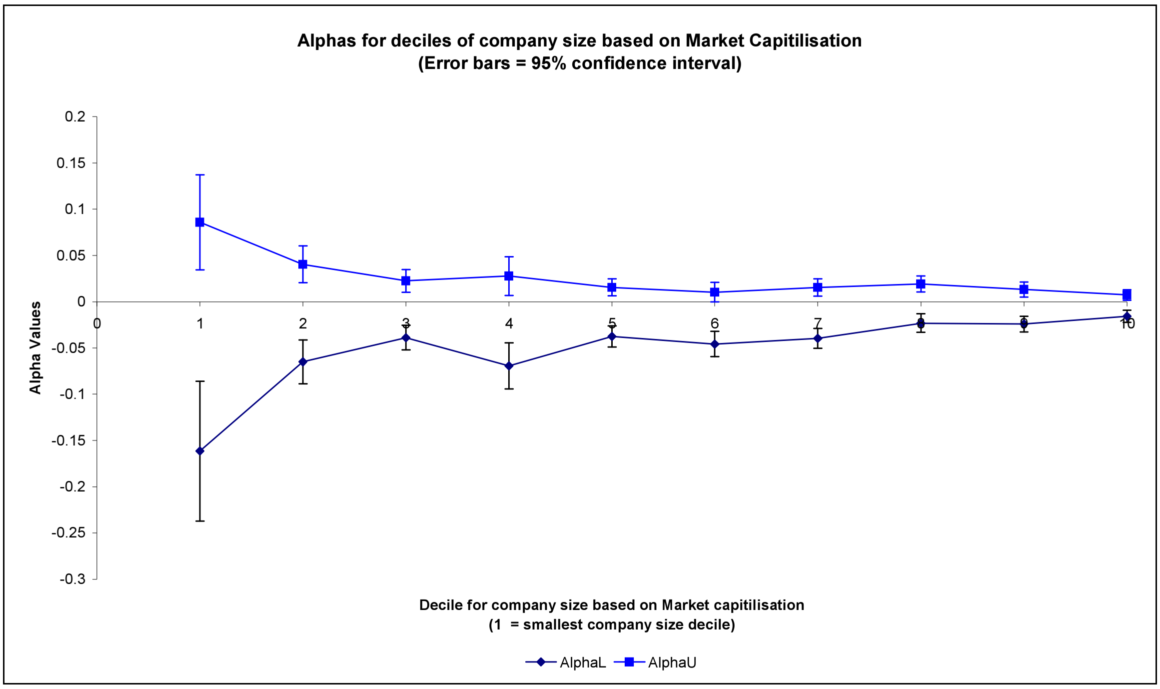
The pattern with respect to the betas associated with ΔEPS in Table K-3 and Figure K-2 is more complex. The 7th and 8th deciles furnish significant positive betas with high values relative to all other deciles, while the top decile furnishes the beta that is closest to zero — and which is insignificant. In terms of the top decile, this result shows the absence of reactivity which has been apparent in all results associated with companies whose shares traded on 100 days out of 100 during the expected return estimation period, since, generally speaking, large firms tend to enjoy their shares being traded on a more frequent basis than do smaller firms. The beta close to zero suggests that a larger shift in earnings is required to achieve a change in share price (as measured by ARt_0 here).

Figure K-2: Day Zero ΔEPS Coefficients by Deciles of Market Capitalisation.



I turn now to the pattern of changes with respect to the size of the friction-region between α_L and α_U. As company size increases though the deciles, the friction region tends to shrink as shown in Figure K-3.[189] This has a very interesting implication. It suggests that smaller firms have to produce larger changes before the friction effect can be overcome.

Figure K-3: Day Zero Alpha Coefficients by Deciles of Market Capitalisation.



It is useful to include 95% confidence intervals in Figure K-3. These are large for the lowest decile observations and become quite narrow for the top decile observations. This suggests that not only do the friction regions shrink with increasing company size, but the boundaries become increasingly certain as well.

The final parameter estimated in the MLE procedures, σ, also tends to decrease in value (although not monotonically) as we step up through the deciles. The bottom decile furnishes the largest standard deviation (approximately 10%) while the top decile furnishes the smallest (approximately 2%). Again this suggests that the ready stream of news associated with large firms enables investors to act with more certainty in their pricing and trading decisions than is the case with small companies for which there is no such high-frequency stream. In the presence of such a stream, dividend and earnings announcements are likely to have been anticipated in advance from other news items, while in the absence of a steady news stream, the dividend and earnings announcements are likely take on a much more iconic role — where ‘iconic’ entails, in the minds of investors, heightened attentiveness to details and wider-ranging guesstimation of implications.

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[189] In this figure, lines have been drawn between the points to emphasise the narrowing effect. The lines do not imply a continuous spectrum.

Appendix K.3 Mid-year versus End-of-year Announcement Effects

A second question of interest is whether there is any tangible difference between mid-year company announcements and year-end announcements. The results for the mid-year announcement events are furnished in Table K-4. Both ΔDPS and ΔEPS have strongly significant mid-year betas which do not differ markedly in size. The ΔDPS beta is a little less than 50% larger.

With respect to the size of change needed to overcome friction to furnish a signal that is acted upon, the region in which friction is greater than any pressure for price to change is approximately 0.07 in this table and also in Table K-5 with respect to the end-of-year announcements. There appears not to be much variation in this aspect of the results. The size of this region seems to be roughly constant.

Table K-4: Equation (6.11) Model on Day Zero restricted to Mid-year Company Announcements.

Parameter	MLE	95% Conf. Int Lower Bound	95% Conf. Int Upper Bound	p-Values
α_L	-0.0385	-0.0473	-0.0298	0.0000
α_U	0.0312	0.0232	0.0392	0.0000
$\beta_{\Delta DPS}$	0.0062	0.0046	0.0078	0.0000
$\beta_{\Delta EPS}$	0.0049	0.0033	0.0065	0.0000
σ	0.0587	0.0537	0.0636	0.0000
384 observations based on INTFIN = 1 (DD-EI and DI-ED excluded)				

I now turn to the end of year announcements in Table K-5. Here, in Table K-5, both variables are significant and it is clear that the beta associated with year-end ΔDPS is close to three times larger than that of ΔEPS. In both Table K-4 and Table K-5, the parameters are all strongly significant in terms of their p-values. But with respect to the relative sizes between mid-year and year-end, the mid-year coefficients for both are much larger in Table K-4 than at the end of the year in Table K-5.

Table K-5: Equation (6.11) Model on Day Zero restricted to Year-end Company Announcements.

Parameter	MLE	95% Conf. Int Lower Bound	95% Conf. Int Upper Bound	p-Values
α_L	-0.0660	-0.0764	-0.0556	0.0000
α_U	0.0174	0.0082	0.0267	0.0001
$\beta_{\Delta DPS}$	0.0042	0.0025	0.0061	0.0000
$\beta_{\Delta EPS}$	0.0015	0.0007	0.0024	0.0002
σ	0.0715	0.0657	0.0772	0.0000
423 observations based on INTFIN = 2 (DD-EI and DI-ED excluded)				

Appendix K.4 Distinction between Day t_0 and other Days in the 21-Day Test Period

There is an announcement of dividends and earnings on day t_0 only. In all other days of the test period, ARs are either related to other phenomena or to an anticipation of, or maybe a belated reaction to the day zero disclosure. ΔDPS and ΔEPS are now applied as leading or lagged independent variables in a series of procedures on the daily ARs — one procedure for each day of the 20 other days of the 21-day test period.

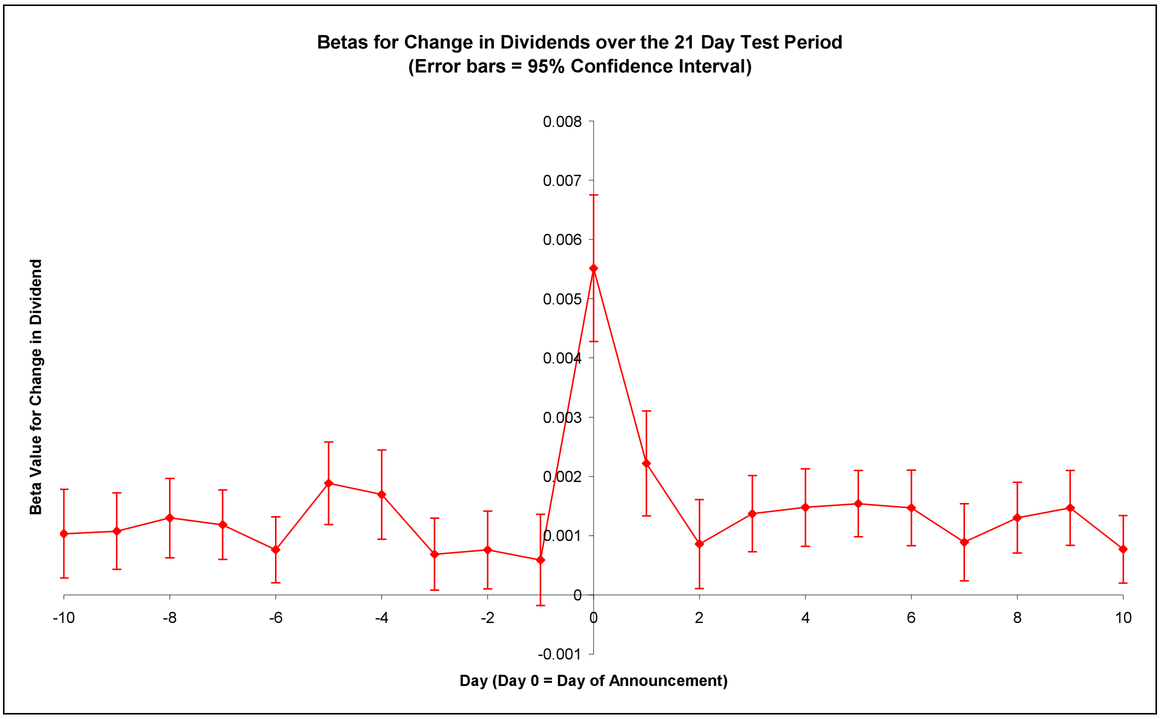
Table K-6: Parameter Estimates for All Days in the Test Period.

Day	α_L	α_U	$\beta_{\Delta DPS}$	$\beta_{\Delta EPS}$	σ
-10	-0.0428 (0.0000)	0.0222 (0.0000)	0.0010 (0.0034)	0.0006 (0.0017)	0.0389 (0.0000)
-9	-0.0398 (0.0000)	0.0176 (0.0000)	0.0011 (0.0005)	0.0008 (0.0000)	0.0336 (0.0000)
-8	-0.0386 (0.0000)	0.0197 (0.0000)	0.0013 (0.0001)	0.0002 (0.1967)	0.0353 (0.0000)
-7	-0.0354 (0.0000)	0.0175 (0.0000)	0.0012 (0.0000)	0.0006 (0.0004)	0.0312 (0.0000)
-6	-0.0335 (0.0000)	0.0145 (0.0000)	0.0008 (0.0037)	0.0001 (0.2334)	0.0290 (0.0000)
-5	-0.0377 (0.0000)	0.0212 (0.0000)	0.0019 (0.0000)	0.0003 (0.0574)	0.0371 (0.0000)
-4	-0.0456 (0.0000)	0.0228 (0.0000)	0.0017 (0.0000)	0.0004 (0.0609)	0.0401 (0.0000)
-3	-0.0340 (0.0000)	0.0139 (0.0000)	0.0007 (0.0139)	0.0006 (0.0014)	0.0322 (0.0000)
-2	-0.0393 (0.0000)	0.0178 (0.0000)	0.0008 (0.0120)	0.0006 (0.0019)	0.0344 (0.0000)
-1	-0.0446 (0.0000)	0.0225 (0.0000)	0.0006 (0.0674)	0.0010 (0.0000)	0.0405 (0.0000)
0	-0.0533 (0.0000)	0.0257 (0.0000)	0.0055 (0.0000)	0.0017 (0.0000)	0.0680 (0.0000)
1	-0.0404 (0.0000)	0.0200 (0.0000)	0.0022 (0.0000)	-0.0001 (0.3333)	0.0484 (0.0000)
2	-0.0429 (0.0000)	0.0211 (0.0000)	0.0009 (0.0124)	0.0003 (0.0605)	0.0396 (0.0000)
3	-0.0351 (0.0000)	0.0176 (0.0000)	0.0014 (0.0000)	0.0006 (0.0007)	0.0345 (0.0000)
4	-0.0378 (0.0000)	0.0185 (0.0000)	0.0015 (0.0000)	0.0005 (0.0084)	0.0351 (0.0000)
5	-0.0351 (0.0000)	0.0155 (0.0000)	0.0015 (0.0000)	0.0002 (0.1448)	0.0299 (0.0000)
6	-0.0364 (0.0000)	0.0166 (0.0000)	0.0015 (0.0000)	0.0004 (0.0255)	0.0344 (0.0000)
7	-0.0389 (0.0000)	0.0185 (0.0000)	0.0009 (0.0038)	0.0003 (0.0988)	0.0345 (0.0000)
8	-0.0375 (0.0000)	0.0178 (0.0000)	0.0013 (0.0000)	0.0008 (0.0000)	0.0314 (0.0000)
9	-0.0366 (0.0000)	0.0173 (0.0000)	0.0015 (0.0000)	0.0004 (0.0135)	0.0336 (0.0000)
10	-0.0341 (0.0000)	0.0159 (0.0000)	0.0008 (0.0041)	0.0005 (0.0027)	0.0298 (0.0000)
In each cell, the upper figure is the MLE parameter estimate and the lower figure in brackets is the associated p-value.					

A priori, one would expect very little change in the daily friction regions (between α_L and α_U). However, there should be steeper linear associations (captured by the betas) between the day zero ARs and the independent variables than with the ARs of any other day. That is, of course, unless there is leakage of the dividend and earnings information in advance. The summary results are laid out in Table K-6 and the next four three figures.

In Table K-6, all but one of the $\beta_{\Delta DPS}$ are significant at the five percent level of error or better; and there is a strong upward spike (0.0055) on day zero which is close to ten times the size of the beta for the preceding day (0.0006). This is about triple the size on all other days. It is illustrated in Figure K-4.

Figure K-4: ΔDPS Coefficients over the 21-Day Test Period.



This indicates that investors react to the dividend information and in doing so increase the ARs earned on day t_0 in a manner that can be captured linearly (ie, the larger the change in dividend, the larger the associated AR). Arguably, the slight rises on days t_{-5} and t_{-4} could be interpreted as investors acting on either anticipated or insider information; and the day t_2 beta, which is the second highest in the test period could be seen as a belated reaction by late receivers of the disclosure.

A similar pattern is observed in Figure K-5 with respect to the $\beta_{\Delta EPS}$ results. However, the day zero spike (0.0017) is only one third of the magnitude of the day zero spike observed with respect to $\beta_{\Delta DPS}$ (0.0055). Further, there is a drop on day t_1 which suggests that on that day there is next to no association between the earnings news and the new day's trading. This really does suggest that the NZX is an efficient market — at least in the processing of earnings information.

Figure K-5: ΔEPS Coefficients over the 21-Day Test Period.

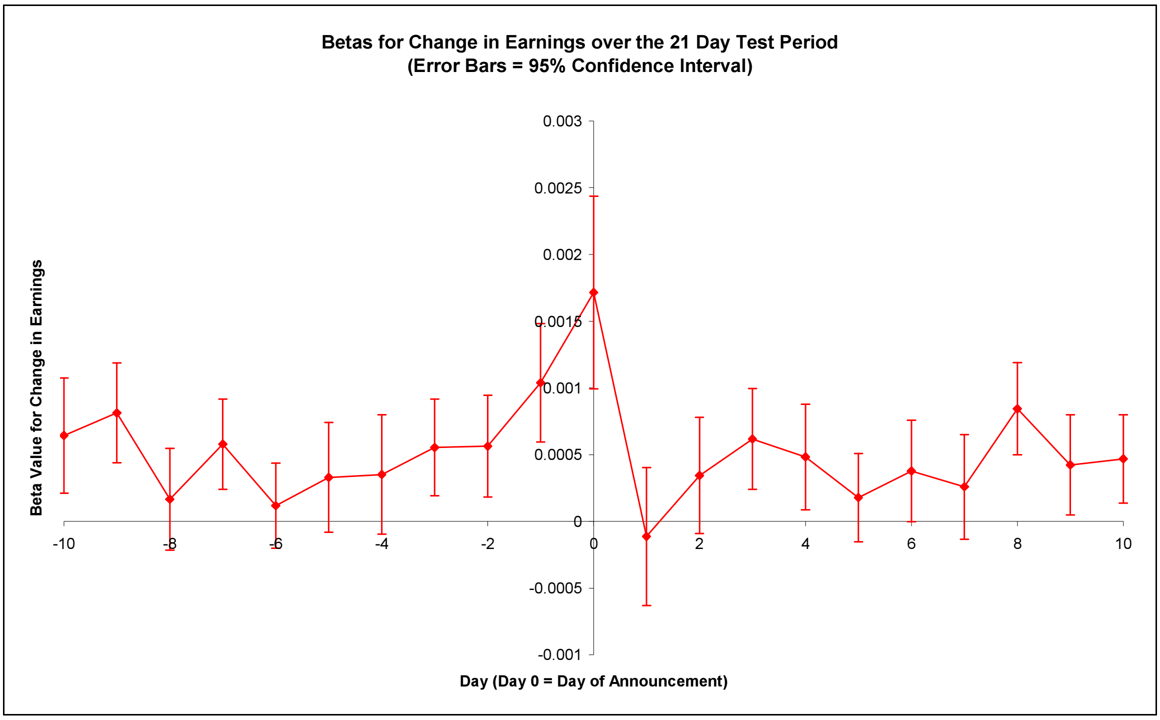
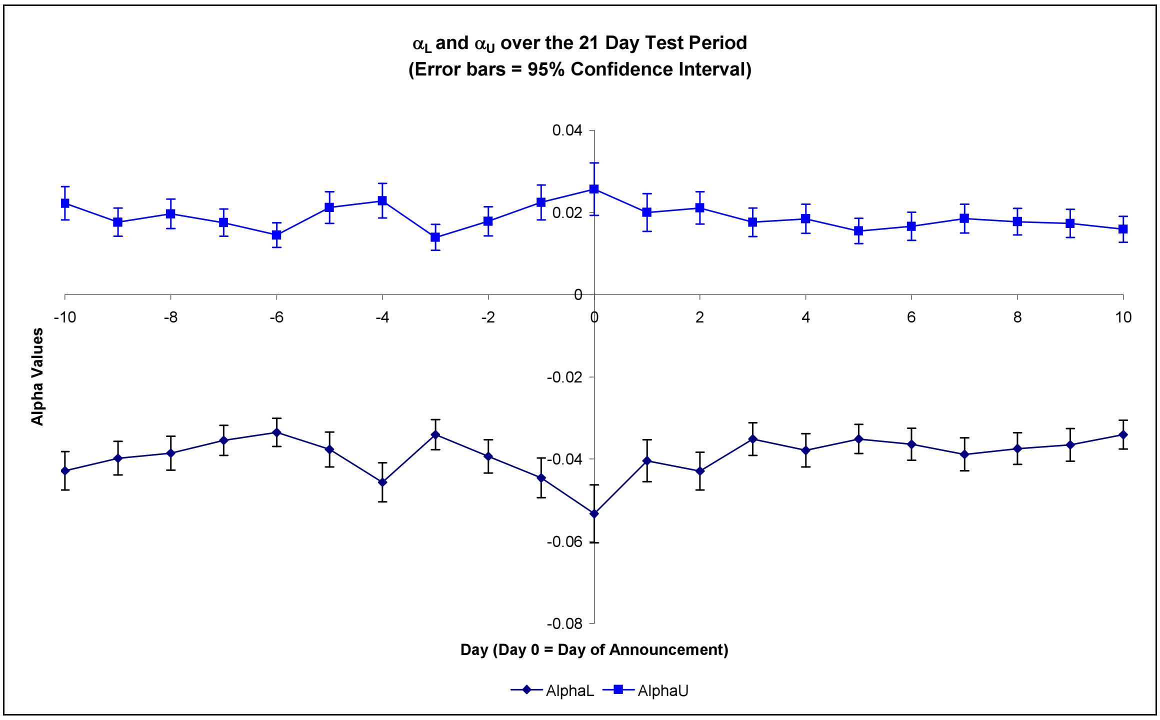


Figure K-6 contains the plots of α_L and α_U. There is a slight widening of the friction region on day t_0; but this widening is hardly significant when one takes the 95% confidence intervals into account.

Figure K-6: Alpha Coefficients over the 21-Day Test Period



Appendix L Four-state Models

The models used in the state model chapter were all based on estimation periods of exactly 100 days; but Norsworthy et al (2004) used estimation periods which were up to fifteen years long. The estimation procedure in this appendix was performed with estimation periods that were 500 days long — which entailed encompassing multiple prior dividend-and-earnings announcement events. Nevertheless, it was of interest to see if an increased estimation period brought the current study's results more into line with those of Norsworthy et al and also Jokung and Meyfredi (2003). Each state was required to have a minimum of six observations in it.

The counts and percentages of datasets which actually did produce coefficients with –p-values that were below the five percent benchmark level for this model were:

Table L-1: Incidence of Significant Results.

Coefficient	N	%
β_{Q1}	758	93.93%
β_{Q2}	802	99.38%
β_{Q3}	800	99.13%
β_{Q4}	757	93.80%
β_{Q1RMt}	448	55.51%
β_{Q2RMt}	62	7.68%
β_{Q3RMt}	418	51.80%
β_{Q4RMt}	44	5.45%

It is of note that more than half of the datasets furnished significant results with respect to the first and third quadrants. This is an improvement on the 100-day estimation period version in Chapter 7 where 30 percent of the datasets produced significant the first quadrant coefficients and 23 percent produced significant third quadrant coefficients.

Table L-2: Four-state Unrotated Model with 500 Days.

	Mean	Min	Max	St Dev
F	38.5527	15.0732	69.1690	8.1749
Sig. F	0.0000	0.0000	0.0000	0.0000
R^2	0.4592	0.0297	0.7886	0.1147
Adj R^2	0.4515	0.0159	0.7855	0.1163
Variance	0.0003	0.0000	0.0157	0.0008
Durbin-Wa	1.9810	1.4824	2.9554	0.1498
β_{Q1}	0.0072	-0.003	0.021	0.0034
t-Stat	4.695	-1.0113	10.7176	1.7558
p-Value	0.0178	0.0000	0.8338	0.0820
β_{Q2}	-0.0221	-0.7661	-0.005	0.0301
t-Stat	-6.1272	-12.5261	-0.5631	1.6526
p-Value	0.0027	0.0000	0.5736	0.0299
β_{Q3}	-0.0198	-0.1934	0.0343	0.0143
t-Stat	-7.2519	-15.1804	1.5128	2.1515
p-Value	0.0019	0.0000	0.6367	0.0245
β_{Q4}	0.0076	0.0004	0.0326	0.0034
t-Stat	3.9992	0.2898	8.181	1.2606
p-Value	0.0158	0.0000	0.7721	0.0686
β_{Q1RMt}	0.3954	-0.9599	2.3633	0.3717
t-Stat	2.9183	-2.003	17.6097	2.9821
p-Value	0.1864	0.0000	0.9982	0.2774
β_{Q2RMt}	0.0268	-11.2921	84.8627	3.1934
t-Stat	-0.1118	-7.3452	10.4484	1.2148
p-Value	0.5080	0.0000	0.9975	0.3030
β_{Q3RMt}	0.518	-2.9606	31.1889	1.2714
t-Stat	3.0313	-3.7586	24.492	3.3495
p-Value	0.2122	0.0000	0.9973	0.2926
β_{Q4RMt}	0.1163	-0.9329	2.5313	0.2686
t-Stat	0.4601	-2.9198	2.8781	0.9156
p-Value	0.4845	0.0037	0.9995	0.2921
N	807			